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By Authority of the Royal Commission.

Honi soit qui mal y pense

LONDON: PRINTED BY WILLIAM CLOWES AND SONS,
PRINTERS TO THE ROYAL COMMISSION,
STAMFORD STREET AND CHARING CROSS.

OFFICIAL

Descriptive and Illustrated Catalogue

OF THE

GREAT EXHIBITION

OF THE

WORKS OF INDUSTRY OF ALL NATIONS,

1851.

THE EARTH IS THE LORD'S AND ALL THAT THEREIN IS;
THE COMPASS OF THE WORLD AND THEY THAT DWELL THEREIN.

PART I.

INTRODUCTORY,

AND

SECTION I.—RAW MATERIALS.—CLASSES 1 to 4.

LONDON:
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EXHIBITION BUILDING.

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NE NOSTRA, ISTA QUÆ INVENIMUS, DIXERIS—
INSITA SUNT NOBIS OMNIUM ARTIUM SEMINA,
MAGISTERQUE EX OCCULTO DEUS, PRODUCIT INGENIA.

HUMANI GENERIS PROGRESSUS,
EX COMMUNI OMNIUM LABORE ORTUS,
UNIUSCUJUSQUE INDUSTRIÆ DEBET ESSE FINIS:
HOC ADJUVANDO,
DEI OPT: MAX: VOLUNTATEM EXSEQUIMUR.

✓C01/S.'84 - P.T.,

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COUNTRIES EXHIBITING.

UNITED KINGDOM.—Classes 1 to 30.

COLONIES.

East Indies, Indian Archipelago, &c.
Jersey and Guernsey.
Ceylon.
Ionian Islands.
Malta.
Cape of Good Hope and Natal.
West Coast of Africa.
Canada.
Nova Scotia.
Newfoundland.
New Brunswick.
St. Helena.
Mauritius, Seychelles, &c.
St. Domingo.
Grenada.
Montserrat.
St. Kitt's.
Barbadoes.
Antigua.
British Guiana.
Bahamas.
Trinidad.
Bermudas.
South Australia.
Western Australia.
New Zealand.
New South Wales.
Van Diemen's Land.
Labuan, Borneo, &c.

FOREIGN STATES.

Austria.
Belgium.
Brazil.
Bremen.
Chili.
China.
Denmark.
Egypt.
France and Algiers.
Germany.—***States of the Zollverein.***
1. **Prussia and Small States.**
    - *a.* **Berlin.**
    - *b.* **Cologne.**
    - *c.* **Dantzic.**
    - *d.* **Dusseldorf.**
    - *e.* **Magdeburgh.**
    - *f.* **Small States.**
2. **Bavaria.**
3. **Saxony.**
4. **Wurtemburg.**
5. **Frankfort-on-the-Maine.**
6. **Hesse-Darmstadt, Grand Duchy of.**
7. **Luxemburg.**
8. **Nassau.**

Greece.
Hamburgh.
Hanover.
Holland.
Lubeck.
Mexico.
Mecklenburg-Strelitz.
New Granada.
Oldenburg.
Persia.
Peru.
Portugal and Madeira.
Rome.
Russia.
Sardinia.
Schleswig-Holstein.
Society Islands.
Spain.
Sweden and Norway.
Switzerland.
Tunis.
Turkey.
Tuscany.
United States and California.

INTRODUCTION.

THE activity of the present day chiefly developes itself in commercial industry, and it is in accordance with the spirit of the age that the nations of the world have now collected together their choicest productions. It may be said without presumption, that an event like this Exhibition could not have taken place at any earlier period, and perhaps not among any other people than ourselves. The friendly confidence reposed by other nations in our institutions; the perfect security for property; the commercial freedom, and the facility of transport, which England pre-eminently possesses, may all be brought forward as causes which have operated in establishing the Exhibition in London. Great Britain offers a hospitable invitation to all the nations of the world, to collect and display the choicest fruits of their industry in her Capital; and the invitation is freely accepted by every civilized people, because the interest both of the guest and host is felt to be reciprocal.

But the consideration of the wide moral agencies which have contributed to produce the present Exhibition must be postponed, and we proceed at once to trace the course of the more direct influences which have lead to its establishment.

Fairs, which are one sort of exhibitions of works of industry, have been established for centuries, in every part of the United Kingdom; but exhibitions resembling the present institution, in which the race is for excellence, and direct commerce is not the primary object, have taken place only during the last century, and have been originated by individuals, or societies, independently of any Government assistance. As early as the years 1756-7 the Society of Arts of London offered prizes for specimens of manufactures, tapestry, carpets, porcelain, &c., and exhibited the works which were offered in competition. About the same period, the Royal Academy, as a private society, patronized by the Sovereign, more in a personal capacity than as representing the head of the Legislature, had organized its exhibitions of painting, sculpture, and engraving.

The first exhibition of industrial productions in France, recognised as a national institution, occurred in 1798, a second took place in 1801, a third in 1802, and a fourth in 1806. But it was not until the year 1819, that the expositions of French industry have taken place systematically; and it is only since that time that the influence of them has been markedly felt in Europe.

Local Exhibitions in United Kingdom.

During the last thirty years, in each of the metropolitan cities of the United Kingdom, and the most important manufacturing towns, one or more exhibitions of machinery and manufactures have been held; and it may be recorded that, as early as 1829, the Royal Dublin Society had founded an exhibition of works of art, science, and manufacture, to be held triennially, to which, however, Irish productions only were admitted until the year 1850. But the local exhibition of Birmingham, held in the autumn of the year 1849—originating with individuals, self-supporting in its management, and comprehensive in the scope of the objects exhibited—may be said to have most nearly resembled the Exhibition of the present year. All similar exhibitions, in fact, have been essentially of a private and local character, none of them receiving any kind of Government or national sanction, if we except the exhibition of manufactures applicable to the decoration of the Houses of Parliament, which was instituted by the Fine Arts Commissioners.

To follow the links of the chain which have connected the present Exhibition with the national sympathies and support, we must revert to the French exposition in 1844. The great success of that exposition caused several representations to be made to members of the Cabinet, of the benefit which a similar exhibition would be likely to confer on the industry of the United Kingdom, and some efforts were made to obtain the assistance of the Government, but with no apparent results. No hopes whatever were held out that the Government would undertake any pecuniary liabilities in promoting such an exhibition. It may be mentioned that, even so late as the year 1848, a proposal to establish a self-supporting exhibition of British industry, to be controlled by a Royal Commission, was submitted to His Royal Highness the Prince Albert, and by him laid before the Government; still the Government hesitated to take up the subject, and it became quite evident to those parties who were most desirous of witnessing the establishment of a national exhibition, that if such an event should ever take place, it would have to be carried out independently of any Government assistance.

It is a marking feature in all the institutions and great works of our country, that they are the consequences of popular wishes. It is not until wants become national, and that combined action becomes essential to success, that the people seek the aid of the Government. The great constitutional freedom which this country enjoys, may be ascribed in some measure to the reluctance which the Government always shows to act on behalf of the people in any case where it is possible they can act for themselves. A great part of the success which has attended the institution of this Exhibition, may be attributed to its independence of the Government; and it may be the boast of our countrymen that the Exhibition was originated, conducted, and completed independently of any Government aid whatever, except its sanction. Assistance has only been sought from the Government when it was indispensable, as in correspondence with foreign countries, the provision of a site for the building, the organization of police, &c.; and wherever such assistance, when granted, would have entailed expense, the cost of it has been defrayed from the funds of the Exhibition.

hibitions of the ciety of Arts.

Step by step, the subject of a national exhibition, and the means of realizing it, became connected with the Society of Arts. In June, 1845, a committee of members of that Society was formed to carry out an exhibition of national industry, and funds were subscribed by the individuals forming the committee to meet the preliminary expenses. An inquiry was set on foot to ascertain the disposition of manufacturers to support the exhibition, but the attempt failed and was abandoned. In 1847 the Council of the Society substituted action for theory, and, in the midst of discouragement, established a limited exhibition of manufactures, professedly as the beginning of a series.

The success of this exhibition determined the Council to persevere, and to hold similar exhibitions annually. Accordingly in the next year the experiment was repeated with such greatly increased success, that the Council felt warranted in announcing their intention of holding annual exhibitions, as a means of establishing a quinquennial Exhibition of British Industry, to be held in 1851. Having proceeded thus far, the Council sought to connect the Schools of Design, located in the centres of manufacturing industry, with the proposed exhibitions, and obtained the promised co-operation of the Board of Trade, through the President, Mr. LABOUCHERE; moreover, with a view to prepare a suitable building, they secured the promise of a site from the Earl of CARLISLE, then Chief Commissioner of Woods and Forests, who offered either the central area of Somerset House, or some other Government ground. In the year 1849 the exhibition, still more successful than any preceding, consisted chiefly of works in the precious metals, some of which were graciously contributed by HER MAJESTY. To aid in carrying out their intention of holding a National Exhibition in the year 1851, the Council of the Society caused a report on the French Exposition, held in 1849, to be made for them and printed. A petition was also presented by the Council to the House of Commons, praying that they might have the use of some public building for the exhibition of 1851, which was referred to the Select Committee on the School of Design.

Enlarged by Prince Albert.

HIS ROYAL HIGHNESS THE PRINCE ALBERT, as President of the Society, had of course been fully informed, from time to time, of all these proceedings, which had received His Royal Highness's sanction and approval; but immediately after the termination of the session of 1849, the Prince took the subject under his own personal superintendence. He proceeded to settle the general principles on which the proposed exhibition for 1851 should be conducted, and to consider the mode in which it should be carried out.

His Royal Highness's views.

His Royal Highness has himself fully expressed the views which prompted him to take the lead in carrying out the Exhibition, and on the occasion of the banquet to promote the Exhibition, given by Mr. FARNCOMB, the Lord Mayor of London, to the municipal authorities of the United Kingdom, His Royal Highness declared these views in the following terms:—

> It must, indeed, be most gratifying to me, to find that a suggestion which I had thrown out, as appearing to me of importance at this time, should have met with such universal concurrence and approbation; for this has proved to me that the view I took of the peculiar character and requirements of our age was in accordance with the feelings and opinions of the country. Gentlemen, I conceive it to be the duty of every educated person closely to watch and study the time in which he lives; and, as far as in him lies, to add his humble mite of individual exertion to further the accomplishment of what he believes Providence to have ordained. Nobody, however, who has paid any attention to the particular features of our present era, will doubt for a moment that we are living at a period of most wonderful transition, which tends rapidly to the accomplishment of that great end to which, indeed, all history points—the realization of the unity of mankind. Not a unity which breaks down the limits, and levels the peculiar characteristics of the different nations of the earth, but rather a unity the result and product of those very national varieties and antagonistic qualities. The distances which separated the different nations and parts of the globe are gradually vanishing before the achievements of modern invention, and we can traverse them with incredible ease; the languages of all nations are known, and their acquirements placed within the reach of everybody; thought is communicated with the rapidity and even by the power of lightning. On the other hand, the great principle of division of labour, which may

be called the moving power of civilization, is being extended to all branches of science, industry, and art. Whilst formerly the greatest mental energies strove at universal knowledge, and that knowledge was confined to the few, now they are directed to specialties, and in these again even to the minutest points; but the knowledge acquired becomes at once the property of the community at large. Whilst formerly discovery was wrapt in secresy, the publicity of the present day causes that no sooner is a discovery or invention made, than it is already improved upon and surpassed by competing efforts; the products of all quarters of the globe are placed at our disposal, and we have only to choose which is the best and cheapest for our purposes, and the powers of production are intrusted to the stimulus of competition and capital. So man is approaching a more complete fulfilment of that great and sacred mission which he has to perform in this world. His reason being created after the image of God, he has to use it to discover the laws by which the Almighty governs his creation, and, by making these laws his standard of action, to conquer Nature to his use—himself a divine instrument. Science discovers these laws of power, motion, and transformation: industry applies them to the raw matter, which the earth yields us in abundance, but which becomes valuable only by knowledge: art teaches us the immutable laws of beauty and symmetry, and gives to our productions forms in accordance with them. Gentlemen,—THE EXHIBITION of 1851 is to give us a true test and a living picture of the point of development at which the whole of mankind has arrived in this great task, and a new starting point from which all nations will be able to direct their further exertions. I confidently hope the first impression which the view of this vast collection will produce upon the spectator will be that of deep thankfulness to the Almighty for the blessings which He has bestowed upon us already here below; and the second, the conviction that they can only be realized in proportion to the help which we are prepared to render to each other—therefore, only by peace, love, and ready assistance, not only between individuals, but between the nations of the earth.

Meeting at Buckingham Palace.

On the 29th June, 1849, the general outlines of the Exhibition were discussed by His Royal Highness; and from that day to the present time, accurate accounts of all proceedings have been kept, and the greater part of them printed and published. The minutes of a meeting of several members of the Society of Arts, held at Buckingham Palace on the 30th June, set forth as follows:—

His Royal Highness communicated his views regarding the formation of a Great Collection of Works of Industry and Art in London in 1851, for the purposes of exhibition, and of competition and encouragement.

His Royal Highness considered that such Collection and Exhibition should consist of the following divisions:—

Raw Materials.
Machinery and Mechanical Inventions.
Manufactures.
Sculpture and Plastic Art generally.

It was a matter of consideration whether such divisions should be made subjects of simultaneous exhibition, or be taken separately. It was ultimately settled that, on the first occasion at least, they should be simultaneous.

Various sites were suggested as most suitable for the building; which it was settled must be, on the first occasion at least, a temporary one. The Government had offered the area of Somerset House; or if that were unfit, a more suitable site on the property of the Crown. His Royal Highness pointed out the vacant ground in Hyde Park on the south side, parallel with, and between, the Kensington drive and the ride commonly called Rotten Row, as affording advantages which few other places might be found to possess. Application for this site could be made to the Crown.

It was a question whether this Exhibition should be exclusively limited to British industry. It was considered that, whilst it appears an error to fix any limitation to the productions of machinery, science, and taste, which are of no country, but belong, as a whole, to the civilized world, particular advantage to British industry might be derived from placing it in fair competition with that of other nations.

It was further settled that, by offering very large premiums in money, sufficient inducement would be held out to the various manufacturers to produce works which, although they might not form a manufacture profitable in the general market, would, by the effort necessary for their accomplishment, permanently raise the powers of production, and improve the character of the manufacture itself.

It was settled that the best mode of carrying out the execution of these plans would be by means of a Royal Commission, of which His Royal Highness would be at the head. His Royal Highness proposed that inasmuch as the home trade of the country will be encouraged, as many questions regarding the introduction of foreign productions may arise,—in so far also as the Crown property may be affected, and Colonial products imported,—the Secretaries of State, the Chief Commissioner of Woods, and the President of the Board of Trade, should be ex-officio members of this Commission; and for the execution of its details some of the parties present, who are also members or officers of the Society of Arts, and who have been most active in originating and preparing for the execution of this plan, should be suggested as members, and that the various interests of the community also should be fully represented therein.

It was settled that a draft of the proposed Commission, grounded on precedents of other Royal Commissions, be prepared, and that information regarding the most expeditious and direct mode of doing this be procured, and privately submitted to Her Majesty's Government, in order that no time be lost in preparation for the collection when the authority of the Government shall have been obtained.

It was settled that a subscription for donations on a large scale, to carry this object into effect, would have to be organized immediately. It was suggested that the Society for Encouragement of Arts under its charter possessed machinery and an organization which might be useful, both in receiving and holding the money, and in assisting the working out of the Exposition.—(*Minutes of the Meeting on the 30th of June*, 1849, *at Buckingham Palace.*)

Meeting at Osborne.

The minutes of a second meeting held on the 14th July, at Osborne, are as follows :—

His Royal Highness stated that he had recently communicated his views regarding the formation of a great collection of works of industry and art in London in 1851, for the purpose of exhibition, and of competition and encouragement, to some of the leading statesmen, and amongst them to Sir Robert Peel.

His Royal Highness judged, as the result of these communications, that the importance of the subject was fully appreciated, but that its great magnitude would necessarily require some time for maturing the plans essential to secure its complete success.

His Royal Highness communicated that he had also requested Mr. Labouchere, as President of the Board of Trade, to give his consideration to this subject. Mr. Labouchere was now at Osborne, and His Royal Highness expressed his desire that he should be present at this meeting. Mr. Labouchere was accordingly invited to be present.

His Royal Highness gave it as his opinion that it was most important that the co-operation of the Government and sanction of the Crown should be obtained for the undertaking; but that it ought to be matter for serious consideration how that co-operation and sanction could be most expediently given.

Mr. Labouchere stated that the whole subject would have the very best consideration he could give it; and on behalf of the Ministry, he could promise an early decision as to the manner in which they could best give their co-operation.

He suggested that if, instead of a Royal Commission being formed, to include some of the chief members of Her Majesty's Government, those same Ministers were to be elected members of a Managing Committee of the Society of Arts, this object might perhaps be as well accomplished.

It was explained to Mr. LABOUCHERE that the exertions of the Society of Arts would be given to the undertaking, to the utmost extent to which they could be useful; but that these functions would necessarily be of an executive and financial nature, rather than of a judicial and legislative character.

It was further urged by the three members of the Society, that one of the requisite conditions for the acquirement of public confidence was, that the body to be appointed for the exercise of those functions should have a sufficiently elevated position in the eyes of the public, and should be removed sufficiently high above the interests, and remote from the liability of being influenced by the feelings of competitors, to place beyond all possibility any accusation of partiality or undue influence; and that no less elevated tribunal than one appointed by the Crown, and presided over by His Royal Highness, could have that standing and weight in the country, and give that guarantee for impartiality that would command the utmost exertions of all the most eminent manufacturers at home, and particularly abroad: moreover, that the most decided mark of *national* sanction must be given to this undertaking, in order to give it the confidence, not only of all classes of our own countrymen, but also of foreigners accustomed to the expositions of their own countries, which are conducted and supported exclusively by their Governments.

It was also stated that, under such a sanction, and with such plans as now proposed, responsible parties would, it was believed and could be proved, be found ready to place at the disposal of the Commission sufficient funds to cover all preliminary expenses and the risks incidental to so great an undertaking.

Mr. LABOUCHERE expressed his sense of the great national importance of the proposal, and wished such further communication on the subject as might enable him fully to understand it, to be able better to consider the matter with his colleagues in the Cabinet.

Plan of operations.

At the same time a general outline of a plan of operations was submitted:—

I. A ROYAL COMMISSION.—For promoting Arts, Manufactures, and Industry, by means of a great Collection of Works of Art and Industry of All Nations, to be formed in London, and exhibited in 1851. President, HIS ROYAL HIGHNESS PRINCE ALBERT.

1. The duties and powers of the Commission to extend to the determination of the nature of the prizes, and the selection of the subjects for which they are to be offered.
2. The definition of the nature of the Exhibition, and the best manner of conducting all its proceedings.
3. The determination of the method of deciding the prizes, and the responsibility of the decision.

II. THE SOCIETY OF ARTS.—To organize the means of raising funds to be placed at the disposal of the Commission for Prizes, and to collect the funds and contributions to provide a building and defray the necessary expenses to cover the risks of the collection and exhibition; and to provide for the permanent establishment of these Quinquennial Exhibitions.

The prizes proposed to be submitted for the consideration of the Commission to be medals, with money prizes so large as to overcome the scruples and prejudices even of the largest and richest manufacturers, and ensure the greatest amount of exertion. It was proposed that the first prize should be £5,000, and that one, at least of £1,000, should be given in each of the four sections. Medals conferred by the Queen would very much enhance the value of the prizes.

Mr. LABOUCHERE finally stated that the whole matter should be carefully considered; but that there was no use in bringing it before the Cabinet at the moment of a closing session—that the Cabinet would now disperse, and not meet again till the autumn. The interval from now to October or November might be most usefully employed by the Society in collecting more detailed evidence as to the readiness of the great manufacturing and commercial interests to subscribe to and support the undertaking, and he promised to employ that interval in further informing himself, and endeavouring to ascertain the general feeling of the country on the subject.—(*Minutes of the Meeting on the* 14*th of July*, 1849, *at Osborne.*)

On the 31st July, 1849, His Royal Highness addressed a letter to the Home Secretary, in order to bring the subject officially to the notice of Her Majesty's Government.

The Prince's letter to the Home Secretary.

SIR, *Osborne, July* 31, 1849.

THE Society of Arts having during several years formed exhibitions of works of national industry, which have been very successful, believe that they have thereby acquired sufficient experience, and have sufficiently prepared the public mind, to venture upon the execution of a plan they have long cherished—to invite a Quinquennial Exhibition in London of the Industry of All Nations.

They think that the only condition wanting to ensure the success of such an undertaking, would be the sanction of the Crown, given in a conspicuous manner; and they are of opinion that no more efficacious mode could be adopted than the issue of a Royal Commission to inquire into, and report upon, the practicability of the scheme, and the best mode of executing it.

I have therefore been asked, as President of the Society, to bring this matter officially before you, and to beg that Her Majesty's Government will give this subject their best consideration.

The Exhibition was proposed to be invited for 1851, and the magnitude of the necessary preliminary arrangements renders it highly desirable that the decision which the Government may have come to should be ascertained within the space of a few months.

I have, &c.,

(Signed) ALBERT.

The Right Honourable
Sir George Grey, Bart., G.C.B.,
&c. &c. &c.

Answer.

SIR, *Whitehall, August* 1*st*, 1849.

I HAVE had the honour to receive your Royal Highness's letter of the 31st July, suggesting the issue of a Royal Commission to inquire into, and report upon, the practicability of a scheme which has been formed by the Society of Arts for a Quinquennial Exhibition in London of the Industry of all Nations.

I shall not fail, in obedience to your Royal Highness's command, to take an early opportunity of bringing this important subject under the consideration of Her Majesty's Government, and I am confident that it will receive their careful and deliberate attention.

I have, &c.,

(Signed) G. GREY.

To His Royal Highness Prince Albert, K.G.

(*Minutes of the Meeting on the* 3*rd of September*, 1849, *at Balmoral.*)

Pecuniary arrangements to insure execution of the proposal.

In this stage of the proceeding it became necessary to place the accomplishment of the undertaking, as far as possible, beyond a doubt. Having acquired experience, in 1845, of the difficulties to be encountered, the Council of the Society of Arts felt that the proposal must not be brought a second time before the public as an hypothesis, but that the only means of succeeding was to prove that they had both the will and the power to carry out the Exhibition. The Society had no funds of its own available for the advances necessary to be made. The outlay for a building upon the scale then thought of, and for preliminary expenses, was estimated at the least at £70,000.

After much fruitless negotiation with several builders and contractors, an agreement was made between the Society of Arts and the Messrs. MUNDAY, by which the latter undertook to deposit £20,000 as a prize fund, to erect a suitable building, to find offices, to advance the money requisite for all preliminary expenses, and to take the whole risk of loss on certain conditions. It was proposed that the receipts arising from the Exhibition should be dealt with as follows:—The £20,000 prize fund, the cost of the building, and five per cent. on all advances, were to be repaid in the first instance: the residue was then to be divided into three equal parts; one part was to be paid at once to the Society of Arts as a fund for future exhibitions; out of the other two parts all other incidental costs, such as those of general management, preliminary expenses, &c., were to be paid; and the residue, if any, was to be the remuneration of the contractors, for their outlay, trouble, and risk. Subsequently the contractors agreed that instead of this division they would be content to receive such part of the surplus, if any, as, after payment of all expenses, might be awarded by arbitration. This contract was made on 23rd August, 1849, but the deeds were not signed until the 7th November following.

For the purpose of carrying the contract into execution on behalf of the Society, the Council nominated an Executive Committee of four members, who were afterwards appointed the Executive in the Royal Commission, and the contractors their own nominee. In thus making the contract with private parties for the execution of what, in fact, would become a national object, if the proposal should be entertained by the public, every care was taken to anticipate the public wishes, and to provide for the public interests. It was foreseen that if the public identified itself with the Exhibition, they would certainly prefer not to be indebted to private enterprise and capital for carrying it out. A provision was made with the contractors to meet this probability, by which it was agreed, that if the Treasury were willing to take the place of the contractors, and pay the liabilities incurred, the Society of Arts should have the power of determining the contract before the 1st February, 1850. In the event of an exercise of this power the compensation to be paid to the Messrs. MUNDAY for their outlay and the risk was to be settled by arbitration.

The Society of Arts having thus secured the performance of the pecuniary part of the undertaking, the next step taken was to ascertain the readiness of the public to promote the Exhibition. It has been shown that the proof of this readiness would materially influence Her Majesty's Government in consenting to the proposal to issue a Royal Commission to superintend the Exhibition. The Prince ALBERT, as President of the Society of Arts, therefore commissioned several members of the Society, in the autumn of 1849, to proceed to the "manufacturing districts of the country, in order to collect the opinions of the leading manufacturers, and further evidence with reference to a Great Exhibition of the Industry of all Nations to be held in London in the year 1851, in order that His Royal Highness might bring the results before Her Majesty's Government." Commissioners were appointed, visits made, and reports of the results submitted to the Prince, from which it appeared that 65 places, comprehending the most important cities and towns of the United Kingdom, had been visited. Public meetings had been held, and local committees of assistance formed in them.

Visits to the manufacturing districts.

It further appeared that nearly 5000 influential persons had registered themselves as promoters of the proposed Exhibition.

Royal Commission appointed.

Upon the presentation of these reports to Her Majesty's Government, the Queen was pleased to issue the following Commission, which was published in the London Gazette of 3rd January, 1850 :—

Victoria, R.

Victoria, by the grace of God, of the United Kingdom of Great Britain and Ireland, Queen, Defender of the Faith: To Our most dearly-beloved Consort His Royal Highness Francis Albert Augustus Charles Emanuel, Duke of Saxony, Prince of Saxe-Coburg and Gotha, Knight of Our Most Noble Order of the Garter, and Field-Marshal in Our army ;—Our right trusty and right entirely well-beloved cousin and Councillor Walter Francis Duke of Buccleuch and Queensberry, Knight of Our Most Noble Order of the Garter; Our right trusty and right well-beloved cousin William Earl of Rosse, Knight of Our Most Illustrious Order of St. Patrick; Our right trusty and right-well beloved cousins and Councillors, Granville George Earl Granville, and Francis Earl of Ellesmere; Our right trusty and well-beloved Councillor Edward Geoffrey Lord Stanley; Our right trusty and well-beloved Councillors, John Russell (commonly called Lord John Russell), Sir Robert Peel, Baronet, Henry Labouchere, and William Ewart Gladstone; Our trusty and well-beloved Sir Archibald Galloway, Knight Commander of Our Most Honourable Order of the Bath, and Major-General in Our Army in the East Indies, Chairman of the Court of Directors of the East India Company,* or the Chairman of the Court of Directors of the East India Company for the time being; Sir Richard Westmacott, Knight; Sir Charles Lyell, Knight, President of the Geological Society of London, or the President of the Geological Society of London for the time being;† Thomas Baring, Esquire; Charles Barry, Esquire; Thomas Bazley, Esquire; Richard Cobden, Esquire; William Cubitt, Esquire, President of the Institution of Civil Engineers, or the President of the Institution of Civil Engineers for the time being; Charles Lock Eastlake, Esquire;‡ Thomas Field Gibson, Esquire; John Gott, Esquire; Samuel Jones Loyd, Esquire;§ Philip Pusey, Esquire; and William Thompson, Esquire, greeting:

Whereas the Society for the Promotion of Arts, Manufactures, and Commerce, incorporated by Our Royal Charter, of which Our most dearly-beloved Consort the Prince Albert is President, have of late years instituted Annual Exhibitions of the Works of British Art and Industry, and have proposed to establish an enlarged Exhibition of the Works of Industry of all Nations, to be holden in London in the year 1851, at which Prizes and Medals, to the value of at least Twenty Thousand Pounds Sterling, shall be awarded to the Exhibitors of the most meritorious works then brought forward; and have invested in the Names of Our right trusty and entirely beloved cousin Spencer Joshua Alwyne Marquess of Northampton; Our right trusty and right well-beloved cousin and Councillor George William Frederick Earl of Clarendon, Knight of Our Most Noble Order of the Garter; Our trusty and well-beloved Sir John Peter Boileau, Baronet, and James Courthope Peache, Esquire, the sum of Twenty Thousand Pounds, to be awarded in Prizes and Medals as aforesaid: and have appointed our trusty and well-beloved Arthur Kett Barclay, Esquire, William Cotton, Esquire, Sir John William Lubbock, Baronet, Samuel Morton Peto, Esquire, and Baron Lionel de Rothschild, to be the

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* At his death in 1850, he was succeeded by John Shepherd, Esq.

† Succeeded by William Hopkins, Esquire, M.A., Cambridge, though Sir C. Lyell still remains a Commissioner by election under the Royal Charter afterwards granted.

‡ Now Sir C. L. Eastlake, President of the Royal Academy.

§ Now Baron Overstone.

Treasurers for all Receipts arising from donations, subscriptions, or any other source on behalf of or towards the said Exhibition; Our trusty and well-beloved PETER LE NEVE FOSTER, JOSEPH PAYNE, and THOMAS WINKWORTH, Esquires, to be the Treasurers for payment of all Executive Expenses; and Our trusty and well-beloved HENRY COLE, CHARLES WENTWORTH DILKE, the younger, GEORGE DREW, FRANCIS FULLER, and ROBERT STEPHENSON, Esquires, with our trusty and well-beloved MATTHEW DIGBY WYATT, Esquire, as their Secretary, to be an Executive Committee for carrying the said Exhibition into effect, under the directions of Our most dearly beloved Consort:

AND whereas the said Society for the Promotion of Arts, Manufactures, and Commerce, have represented unto Us, that in carrying out the objects proposed by the said Exhibition, many questions may arise regarding the introduction of productions into Our kingdom from Our Colonies, and from Foreign Countries; also regarding the site for the said Exhibition; and the best mode of conducting the said Exhibition; likewise regarding the determination of the nature of the Prizes, and the means of securing the most impartial distribution of them; and have also besought Us that We would be graciously pleased to give Our sanction to this undertaking, in order that it may have the confidence, not only of all classes of Our subjects, but of the subjects of Foreign Countries:

NOW KNOW YOU THAT WE, considering the premises, and earnestly desiring to promote the proposed Exhibition, which is calculated to be of great benefit to Arts, Agriculture, Manufactures, and Commerce, and reposing great trust and confidence in your fidelity, discretion, and integrity, have authorized and appointed, and by these presents do authorize and appoint you, Our most dearly beloved Consort FRANCIS ALBERT EMANUEL Duke of SAXONY, Prince of SAXE-COBOURG AND GOTHA, you WALTER FRANCIS DUKE of BUCCLEUCH AND QUEENSBERRY; WILLIAM Earl of ROSSE; GRANVILLE GEORGE Earl GRANVILLE; FRANCIS Earl of ELLESMERE; EDWARD GEOFFREY Lord STANLEY; JOHN RUSSELL (commonly called Lord JOHN RUSSELL), Sir ROBERT PEEL, HENRY LABOUCHERE, WILLIAM EWART GLADSTONE, Sir ARCHIBALD GALLOWAY, or the Chairman of the Court of Directors of the East India Company for the time being, Sir RICHARD WESTMACOTT, Sir CHARLES LYELL, or the President of the Geological Society for the time being, THOMAS BARING, CHARLES BARRY, THOMAS BAZLEY, RICHARD COBDEN, WILLIAM CUBITT, or the President of the Institution of Civil Engineers for the time being, CHARLES LOCK EASTLAKE, THOMAS FIELD GIBSON, JOHN GOTT, SAMUEL JONES LOYD, PHILIP PUSEY, and WILLIAM THOMPSON, to make full and diligent inquiry,—into the best mode by which the productions of Our Colonies and of Foreign Countries may be introduced into Our kingdom;—as respects the most suitable site for the said Exhibition,—the general conduct of the said Exhibition;—and also into the best mode of determining the nature of the Prizes, and of securing the most impartial distribution of them:

AND to the end that Our Royal Will and Pleasure in the said inquiry may be duly prosecuted, and with expedition, WE FURTHER, BY THESE PRESENTS, WILL AND COMMAND, and do hereby give full power and authority to you, or any three or more of you, to nominate and appoint such several persons of ability as you may think fit to be Local Commissioners, in such parts of Our kingdom and in Foreign parts as you may think fit, to aid you in the premises; which said Local Commissioners, or any of them, shall and may be removed by you, or any three or more of you, from time to time, at your will and pleasure, full power and authority being hereby given to you, or any three or more of you, to appoint others in their places respectively.

AND FURTHERMORE, We do, by these Presents, give and grant to you, or any three or more of you, full power and authority to call before you, or any three or more of you, all such persons as you shall judge necessary, by whom you may be the better informed of the truth of the premises, and to inquire of the premises, and every part thereof, by all other lawful ways and means whatsoever.

AND OUR FURTHER WILL AND PLEASURE IS, That for the purpose of aiding you in the execution of these premises, We hereby appoint Our trusty and well-beloved JOHN SCOTT

RUSSELL and STAFFORD HENRY NORTHCOTE,* Esquires, to be joint Secretaries to this Our Commission.

AND for carrying into effect what you shall direct to be done in respect of the said Exhibition, We hereby appoint the said HENRY COLE, CHARLES WENTWORTH DILKE the younger, GEORGE DREW, FRANCIS FULLER, and ROBERT STEPHENSON, to be the Executive Committee in the premises, and MATTHEW DIGBY WYATT to be the Secretary of the said Executive Committee.

AND OUR FURTHER WILL AND PLEASURE IS, That you, or any three or more of you, when and so often as need or occasion shall require, so long as this Our Commission shall continue in force, do report to Us in writing, under your hands and seals respectively, all and every of the several proceedings of yourselves had by virtue of these presents, together with such other matters, if any, as may be deserving of Our Royal consideration touching or concerning the premises.

AND LASTLY, WE DO BY THESE PRESENTS ORDAIN, That this Our Commission shall continue in full force and virtue, and that you Our said Commissioners, or any three or more of you, shall and may, from time to time, and at any place or places, proceed in the execution thereof, and of every matter and thing therein contained, although the same be not continued from time to time by adjournment.

Given at Our Court at St. James's, the 3rd day of January,
in the 13th year of Our reign.

By Her Majesty's Command,
G. GREY.

The foresight of the Society of Arts, which had provided a mode by which the contract might be determined in conformity with the public wishes, was fully justified by the event. So far as the public manifested its opinion it appeared to be its wish that the undertaking should be carried out as a national work. Accordingly at the first meeting of the Commissioners, held on 11th January, 1850, the propriety of confirming the contract was discussed, and they resolved to avail themselves of the powers which the Council of the Society of Arts had reserved. The first act of the Commissioners was the publication of the following announcement:—

Determination o the Contract with the Society of Arts.

The Royal Commissioners have felt it their duty, at this their first meeting, to take into their immediate consideration the propriety of confirming the Contract which has been entered into with Messrs. MUNDAY.

They are perfectly satisfied that the contract was framed with the sole desire on the part of the Society of Arts of promoting the objects of the Commission,—that in agreeing to it at a time when the success of the scheme was necessarily still doubtful, the Messrs. MUNDAY evinced a most liberal spirit,—that it has hitherto afforded the means of defraying all the preliminary expenses,—and that its conditions are strictly reasonable, and even favourable to the public.

After hearing, however, the statements made by individual members of the Commission,—after communicating with the Executive Committee,—and after a full consideration of the whole subject,—the Commissioners have come to the conclusion that it will be more consonant with the public feeling, and therefore more conducive to the objects for which the Commission has been appointed, to exercise the power reserved, and at once and absolutely to terminate the contract with the Messrs. MUNDAY.

This determination necessarily throws the whole burden of the Exhibition upon voluntary contributions. The experiment is of a national character, and the Commissioners feel that it ought to rest for its support upon national sympathies, and upon such liberal contributions as those sympathies may dictate.

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* Now Sir STAFFORD H. NORTHCOTE, Bart.

The amount of the funds which the public may place at the disposal of the Commissioners must determine the extent of accommodation which can be provided for the Exhibitors, and the terms on which admission can be given to the articles to be exhibited, and upon which also the public can be admitted to inspect them.

The Commissioners wish it to be understood that they are invested with unrestricted power over the application of the funds; that it is their intention to invite competition in respect of all branches of expenditure to which competition can advantageously be applied; and that they will proceed, without delay, to establish regulations for insuring an effectual control over the expenditure, and a satisfactory audit of the accounts.

The Commissioners feel, that in thus abandoning a contract which, regarded in a pecuniary point of view alone, is undoubtedly advantageous to the public, and resting the success of the proposed experiment entirely upon public sympathy, they have adopted a course in harmony with the general feelings of the community.

It now rests with the public to determine, by the amount of their contributions, the character of the proposed Exhibition, and the extent of benefit to industry in all its branches which will result from it.

It is desirable that subscriptions for this great purpose be immediately commenced throughout the United Kingdom, and the result ascertained with the least possible delay.

In the mean time the Commissioners will be actively engaged in preparing the various measures, upon which it will be their duty to come to a final decision as soon as they are enabled definitely to ascertain the extent of the pecuniary means which will be placed at their disposal.

It is desirable, before giving any account of the proceedings under the Commission, to notice those changes which necessarily supervened upon the determination of the contract. The Commission itself set forth that the functions of the Commissioners were those of inquiry and general direction, whilst all the pecuniary responsibilties, and the performance of all the executive duties, were to be carried out by and in the name of the Society of Arts; but when the contract was cancelled, although the Commission itself was not altered, the practical result was to place on the Commissioners individually and personally the whole responsibility of the undertaking, both pecuniary and executive. Under these circumstances the Executive Committee felt it to be their duty to tender their resignations (*Min.* iv., p. 3), which they did in the following terms:—

The members of the Executive Committee submit that the dissolution by the Royal Commission of the contract, which they had been appointed for the purpose of carrying out, has changed the nature of their functions, and even superseded many of them. They are of opinion, therefore, that it is desirable that the Royal Commission should be left as free to select the best organization for carrying their intentions into effect, as if the Executive Committee had never been appointed. They feel that they should not be acting in accordance with their sincere wishes of witnessing the perfect success of the Exhibition, if they did not come forward to express their entire readiness at once to place their position in the hands of HIS ROYAL HIGHNESS THE PRINCE ALBERT, and the Royal Commissioners.

These resignations were not accepted, and some time elapsed before the executive arrangements were conclusively modified to meet the altered circumstances of the case. It had been the original intention of the Society of Arts in forming the contract, that in the event of its being determined, the liabilities of the contractors should be simply transferred to the Government, and that the original relations between the Commissioners and the Society of Arts should have remained; but this intention does not seem to have been made sufficiently clear by the deed, and it was not urged by the Society of Arts. The deed of contract simply provided that the Treasury should have power to undertake the liabilities and relieve the Society of Arts from them. This the Treasury did, but in doing so, at the same time took a guarantee from the Commissioners themselves, and thus the whole responsibilities rested with them. The answer of the Treasury to the Commissioners was that—

Mutual liabilities of the Treasury and the Commissioners.

> My lords have no intention of rendering themselves liable to the payment of any sum on this account; but as it seems that a request from them, that the contract should be determined, is necessary in order to enable the Commissioners to carry out their own intentions, they have no objection to taking the formal step of making the request suggested by the Commissioners to the Council of the Society of Arts, on receiving from the Commissioners an undertaking that the money will be forthcoming when required by Messrs. MUNDAY in conformity with the stipulations of the contract.

The Commissioners accordingly undertook that the money should be forthcoming when required (*Min.* iii., p 7). The Society of Arts gave the requisite notices to the Messrs. MUNDAY, and in due time all the outlay which they had made, amounting to about £23,000, with the interest which had accrued, was repaid to them.

The pecuniary liabilities having thus devolved wholly on the Commissioners, it became natural that they should desire to appoint a chief executive officer of their own nomination. HER MAJESTY was advised to issue supplemental commissions, appointing Mr. ROBERT STEPHENSON, M.P., a commissioner, upon his resignation as Chairman of the Executive Committee, and Lieutenant-Colonel W. REID, R.E., Chairman of the Executive Committee in his place. These appointments were made by the advice of the Government, Mr. LABOUCHERE stating, "that the subject of the executive arrangements had been under their consideration, and that they had proposed to recommend to HER MAJESTY to appoint Colonel REID to be Chairman of the Executive Committee" (*Min.* v., p. 1). The contractors themselves, as well as their nominee, thereupon ceased to attend the meetings of the Executive Committee.

Public Subscriptions and financial management.

The earliest step which the Commissioners took after the determination of the contract was to appeal to the country for subscriptions to carry out the Exhibition. They announced that they had undertaken the absolute control over the expenditure of all money that might come into the hands of their Treasurers, and had made arrangements for auditing accounts, and ensuring the strictest economy. It was pointed out that the scale upon which this important undertaking would be conducted must depend entirely on the amount of pecuniary support which it should receive from the public. The Commissioners appealed with confidence to all classes of the community, to enable them to make such liberal arrangements as would ensure the success of the undertaking in a manner worthy of the character and position of this country, and of the invitation which had been given to the other nations of the world to compete with us in a spirit of generous and friendly emulation. It was announced that the amount of the funds which the public might place at the disposal of the Commissioners must determine the extent of accommodation which could be provided for the Exhibition; and that should any surplus remain, after giving every facility to the exhibitors, and increasing the privileges of the public as spectators, Her Majesty's Commissioners intended to apply the same to purposes strictly in connection with the ends of the Exhibition, or for the establishment of similar exhibitions for the future.

All subscriptions were considered to be absolute and definite; they were paid to the Treasurers of Local Committees, and by them transferred to the genera fund at the Bank of England, in the names of the Treasurers named in the Royal Commission. An Appendix to this introduction shows that the gross amount of subscriptions reported as having been received has amounted to £75,000. Of this above £64,000 has been paid to the Commissioners, the balance having been reserved by the Local Committees to meet the expenses of collection, printing, &c. The general financial position of the undertaking at the opening of the Exhibition was as follows:—

Receipts.	£.	*Expenditure and Liabilities.*	£.
Subscriptions paid to April 22	64,344	Building	79,800
For privilege to print the Catalogues	3,200	Extra Galleries, Counters, and their fittings, estimated at	35,000
For privilege to sell Refreshments	5,500	By Prize Fund	20,000
By Season Tickets to April 29	40,000	Management, including Printing and all Incidental Expenses incurred up to April	20,943
Admissions of the Public		Management during the Exhibition	
Royalty on sale of 1s. Catalogue			

Subject to the approval of the Commissioners the direct control over this expenditure has been exercised by a Finance Committee, consisting of Lord GRANVILLE (Chairman), Lord OVERSTONE, Mr. LABOUCHERE, Mr. GLADSTONE, Sir ALEXANDER SPEARMAN, Mr. T. F. GIBSON, Mr. T. BARING, Mr. COBDEN, and Mr. PETO. Mr. EDGAR A. BOWRING has acted as Secretary to the Committee, and Assistant Commissary-General CARPENTER, as the financial officer, has administered the actual expenditure of the Commission.

The preceding statement of account shows that, even at the present time, a considerable liability has been incurred by the Commissioners. At the period when it became necessary to make positive arrangements for the erection of the building, the actual receipts were only £35,000: personal responsibility legally attached to His Royal Highness the President, and to every member of the Royal Commission, in respect of every pecuniary engagement. A remedy for this somewhat anomalous position was obtained by means of a charter of incorporation, and the formation of a guarantee fund. The first relieved the Commissioners of all personal responsibility, and the second insured both the completion of the undertaking, and the House of Commons from the liability of being required to make any grant of the national funds towards it.

Charter of Incorporation.

Letters Patent, dated July, 1850, were issued, incorporating the Commissioners, under the title of "The Commissioners for the Exhibition of 1851," and the charter was accepted 15th August, 1850 (*Min.* xxviii. p. 1). A guarantee fund of £230,000 was formed by a limited number of persons, including most of the Commissioners, and other friends of the Exhibition, one of whom opened the list with a subscription of £50,000: upon the security of this fund the Bank of England consented to make such advances of money as might be wanted from time to time.

General principles of the Exhibition.

The fundamental principles upon which it was proposed the Exhibition should be formed had been discussed and settled before the Commission was issued, and are recited in the Commission itself. With the requisite limitations and conditions, these principles were confirmed by the Commissioners, and formally announced in the month of February, 1850, so that there was a full year for preparations. It was declared that the productions of all nations would be admitted, and classified lists of objects were prepared by Committees of eminent persons in each department (whose names are given in an Appendix), and published to show the nature of the contributions which exhibitors were invited to send in the four departments of Raw Materials and Produce, Machinery, Manufactures, and Fine Arts. The regulations by which certain articles were excluded were as follows:—

> Nothing is suitable for the Exhibition, except such results or human industry as are capable of being preserved without injury during many months.
>
> All spirits, wines, and fermented liquors, unless derived from unusual sources, are inadmissible, except in special cases, and under special restrictions; and when oils, spirits, &c., are exhibited, to prevent accidents, they must be shown in well-secured glass vessels.
>
> All highly-inflammable articles, such as gunpowder, detonating powder, lucifer matches, &c., and all live stock, and articles perishable within the duration of the Exhibition, are inadmissible, unless specially excepted.

In respect of the fourth section of the Exhibition, Sculpture, Models, and the Plastic Art, the following were the limitations:—

> Objects formed in any kind of material, if they exhibit such a degree of taste and skill as to come under the denomination of *Fine Art*, may be admitted into this section.
>
> The specimens exhibited shall be works of living artists, or works of artists deceased within three years before the 1st of January, 1850.
>
> Oil paintings and water-colour paintings, frescoes, drawings, and engravings, are not to be admitted, except as illustrations or examples of materials and processes; and portrait busts are not to be admitted.
>
> No single artist will be allowed to exhibit more than three works.

Opening fixed for May 1, 1851.

It was also announced that the 1st day of May, 1851, was fixed for opening the Exhibition, and the engagement has been kept: that Her Majesty had been graciously pleased to grant a site for the Exhibition on the south side of Hyde Park, lying between the Kensington Drive and the Ride commonly called Rotten Row, and that exhibitors would be required to deliver their objects, at their own charge and risk, at the building, which would be provided to them free from rent.

After much examination and inquiry, the Commissioners resolved that prices were not to be affixed to the articles exhibited, although the articles might be marked as shown for economy of production, and the price stated in an invoice to be sent to the Commissioners for the information of the Juries.

Admission of Foreign articles.

It was clear that two very different systems of management would necessarily have to be adopted towards Foreign countries and the United Kingdom, arising out of the different relations of guest and host. Although it was proposed that the expenses of the building and management should be defrayed by voluntary subscriptions, scrupulous care was taken on every occasion to discourage the receipt of any subscription from any foreigner, resident at home or abroad. Over the admission of British articles, the Commissioners reserved to themselves full powers of control; but as respects Foreign articles, the power of admitting them was confided absolutely to an authority of the country which sent them.

In order to give Foreign countries the utmost time for their preparations, and long before the size or character of the building had been determined, the Commissioners resolved to divide a certain large amount of exhibiting space among all Foreign countries, amounting in the whole to above 210,000 superficial feet, or rather more than the entire space which France occupied for its two expositions of 1844 and 1849. It was estimated that this amount would be about half the size of the building, which was considered to be a fair proportion.

Space offered to Foreign countries

The amount of space which was offered to each Foreign country, and placed at its absolute disposal, was as follows:—

	Net superficial Feet allotted.		Net superficial Feet allotted.
Arabia	500	Italy—	
Belgium	15,000	Naples	2,500
Bolivia	100	Rome	1,000
Brazil	1,000	Sardinia	1,500
Buenos Ayres	500	Tuscany	3,750
Central America	300	Mexico	1,000
Chili	500	Monte Video	100
China	2,500	Morocco	500
Denmark	2,500	New Granada	500
Egypt	1,500	Norway and Sweden	2,500
Equator	100	Persia	500
France	50,000	Peru	500
		Portugal	1,000
Germany—		Russia	7,500
Austria	21,750	Spain	2,500
		Switzerland	4,000
Northern Germany—		Tunis	500
States of the Stuerverein	2,250	Turkey	5,000
The Two Mecklenbergs	1,250	United States	40,000
Hanse Towns	1,500	Venezuela	400
Zollverein	30,000	Western Africa	500
Greece	1,000		
Holland	5,000	Total	213,000

Subsequently these amounts were increased in several instances. France, for example, obtained upwards of 65,000 superficial feet of exhibiting space, instead of only 50,000 feet.

Accompanying the allotment of space sent to each Foreign country and colony, the following instructions were transmitted:—

No articles of foreign manufacture, to whomsoever they may belong, or wheresoever they may be, can be admitted for exhibition, *unless they come with the sanction of the central authority of the country of which they are the produce.* All articles forwarded by such central authority will then be admitted, provided they do not require a greater aggregate amount of space than that assigned to the productions of the country from which they come; and, provided also, that they do not violate the general conditions and limitations. It will rest with the central authority in each country to decide upon the merits of the several articles presented for exhibition, and to take care that those which are sent are such as fairly represent the industry of their fellow countrymen.

Her Majesty's Commissioners will consider that to be the central authority in each case which is stated to be so by the Government of its country. Having once been put in communication with a central authority in any country, they must decline, absolutely and entirely, any communication with private and unauthorized individuals; and should any such be addressed to them, they can only refer it to the central body. This decision is essentially necessary, in order to prevent confusion.

The Commissioners do not insist upon articles being in all cases actually forwarded by the central authority. that this would generally be the most satisfactory arrangement; but it is indispensable that the sanction of such authority should in all cases be expressly given, and that it be held responsible for the fitness of such articles for exhibition, and for not authorizing the exhibition of a greater quantity than can be accommodated in the space assigned to the productions of the country in question.

In case the central authority in any country should be of opinion that the space allotted to the productions of that country is greater than it will require, the Commissioners have to request that this opinion may be communicated to them, as it is obvious that it would not appear well if a large vacant space should be left in the department assigned to any country.

And British Colonies.

A definite quantity of space was in like manner offered to each of the British Colonies in the following proportions, and subject to the same rules for admission:

	Net superficial Feet allotted.		Net superficial Feet allotted.
Australian Colonies—		Nova Scotia and Cape Breton	1,000
New South Wales	2,000	Prince Edward's Island	250
New Zealand	500	St. Helena	50
South Australia	350	Sierra Leone	150
Van Diemen's Land	600	West India Colonies—	
West Australia	350	Antigua	375
Bermudas	50	Bahamas	100
Canada	4,000	Barbadoes	750
Cape of Good Hope and Natal	750	British Guiana	100
Cape Coast Castle and Dependencies	100	Dominica	125
Ceylon	1,500	Granada	250
Falkland Islands	25	Jamaica	1,500
Gambia	100	Montserrat	50
Gibraltar	100	Nevis	100
Hong Kong	Nil.	St. Christopher's	250
Hudson's Bay Co.'s Territories	1,000	St. Lucia	250
India, including Singapore	30,000	St. Vincent	250
Ionian Islands	1,000	Tobago	100
Labuan	250	Tortola and Virgin Islands	50
Malta	1,000	Trinidad	750
Mauritius	750		
New Brunswick	750	Total	51,025
Newfoundland	500		

It was intimated that colonial and foreign productions would be admitted for the purposes of exhibition without payment of duty. The building of the Exhibition has been considered as a bonded warehouse, and the Commissioners of Customs have afforded the utmost facilities consistently with that obedience to Customs' laws, which was imperative.

Self-supporting principle of the Exhibition.

Those who have had experience only of the continental systems of exhibitions, which are managed and paid for wholly by their Governments, find it difficult to understand the self-supporting and self-acting principle of the present Exhibition, which has hitherto depended wholly upon the voluntary subscriptions of the British people: the heavy liabilities which still hang over the undertaking rest wholly upon individuals in their private capacity, and not upon the Government. The British people, as well poor and working men, as the richer classes, have had the undivided responsibility, not only of conducting the first experiment of an Exhibition of their own works on a national scale, but of collecting funds to pay all the expenses of an Exhibition of the Works of all Nations. Our National Exchequer has not been charged with any portion of the expenses, but the contributions of the most remote towns have been received and applied, even in payment of the military and police assistance which the Government has permitted to be employed on the occasion. So completely spontaneous has been the organization for the Exhibition, that not even the several municipal councils throughout the country were employed, but an independent organization was created for the express purpose wherever a locality was disposed to form its own Local Committee. Without the assistance of the Local Committees of the United Kingdom, no Exhibition of the Works of Industry of all Nations could ever have been accomplished.

Local Committees of the United Kingdom.

About 65 Local Committees had been formed before the issue of the Royal Commission, with the assistance of the Members of the Society of Arts, who had been nominated by the President to visit different parts of the kingdom. To extend this organization over the whole kingdom, into Local Committees, was one of the first acts of the Royal Commission. A circular was issued to the Mayors of all towns within the United Kingdom, having a municipal constitution (*Min.* i., p. 1), announcing the issue of the Royal Commission, and requesting, if no Local Committee had been formed, that the mayor would communicate with the principal inhabitants for the purpose of ascertaining whether, in their opinion, the circumstances of the town rendered it advisable to appoint a Local Committee. The functions of these Local Committees have chiefly consisted in the recommendation of Local Commissioners to represent the interests of their localities—in encouraging the production of suitable objects for exhibition—in affording information in the locality relative to the Exhibition—in the collection of subscriptions—and in facilitating the means of visiting the Exhibition.

The Commissioners intimated that it was their wish to limit, as far as possible, the necessity for the exercise of the powers of rejection and selection of objects intended for exhibition, and for that purpose to call to their assistance the local knowledge and discretion of the several Local Committees. They recommended that the Local Committees should enter into personal communication with those persons resident within their district, who were likely to be exhibitors; and that they should ascertain the character and number of the objects which it would be their wish to send to the Exhibition. For the purpose of communicating with the Local Committees, the Commissioners appointed Dr. Lyon Playfair, and Lieut.-Colonel Lloyd, Surveyor-General of the Mauritius, Special Commissioners.

Demand for space by British exhibitors.

It was not required that exhibitors should of necessity be subscribers to the fund. All persons desirous of contributing articles to the Exhibition of 1851, were invited to give notice of such intention, and transmit a general description of the nature of each article, and the space which would be required for the exhibition of it, to the Secretary of the nearest Local Committee, and the Local Committee was requested to digest the returns so made to them, and transmit them to the Commission before the 31st Oct., 1850. It was not necessary in the first instance either to exhibit to the Local Committee specimens of the articles to be sent, or to give a minute specification of them. But it was decided that it was necessary for intending exhibitors to obtain the certificate of the nearest Local Committee, of its approval of the articles sent for exhibition, before they could be received by the Commissioners in the building. Upwards of 330 Local Committees were formed in the three parts of the United Kingdom and the Channel Isles. A list of those which have transmitted subscriptions to the fund, or sent articles to the Exhibition, will be found in the Appendix.

The 31st October was appointed the last day when the Local Committees were required to transmit to the Executive Committee the demands for space which intending exhibitors had made through them.

exceed the possible allowance.

It then appeared that the whole of the demands for horizontal (floor and counter) space in the building which the Local Committees of the United Kingdom returned, exceeded 417,000 superficial feet of exhibiting space, being in excess of the amount of available space for the United Kingdom by about 210,000 superficial feet. The amount of vertical or wall space demanded was only 200,000 superficial feet. The number of persons who proposed to exhibit was upwards of 8,200.

Upon the receipt of these data the Commissioners proceeded to adjust the proportions of floor or counter space which it appeared desirable that the four sections of the Exhibition should occupy in the Building. Upon averages, furnished by the whole of the United Kingdom, and obtained by dividing the total amount of space apportioned to each section by the number of exhibitors in that section, the Commissioners, as a general rule, allotted to each Local Committee an amount of space in each section, in proportion to the number of exhibitors which had been returned by each Committee. The Commissioners left the allotment of space to each exhibitor absolutely to the discretion of each Local Committee. They desired that each Local Committee, in allotting space to the individual exhibitors, should, as far as possible, maintain the proportions of the four sections allotted to it, so that in the ultimate arrangement of the whole Exhibition, the space which each section might occupy, should agree as closely as was possible with the spaces fixed by the Commissioners. It was suggested that only those articles which did honour to our industrial skill as a nation should be admitted, and that the industry of the district should be represented with perfect fairness, so as to do the fullest credit to its industrial position.

Reduction of demands for space.

The Commissioners then proceeded to cause copies of each individual application for space to be transmitted to the respective Local Committees for revision and correction where necessary, which, when returned by the Committees, were considered as the vouchers for the admission of the articles, and as tantamount to *their unqualified approbation of the articles.* In no case could a Local Committee *increase* the amount of the *total* space allotted to it by the Commissioners. The Commissioners appointed the 10th December, as the last day on which vouchers were to be received, but it was not until the 10th January, and even much later in some cases, that the Executive Committee obtained the whole of them, by which their labours were considerably increased, and the arrangements delayed.

Appeals.

If any productions had been rejected by any Local Committee, and the proprietor of them desired to appeal against the decision, it was competent for him to address the Commissioners through the Local Committee, who forwarded the appeal, with their own observations, and the Commissioners, upon consideration of the circumstances, confirmed or negatived the decision. The appeals, however, were few.

With the view of providing against the exhibition of duplicate articles of manufacture, the Commissioners, in cases where duplicates might have been admitted by *different* Local Committees, intimated that they would call upon the exhibitors of such duplicates to produce a certificate from the actual makers, stating which of the exhibitors had arranged with the maker to be proprietor of the absolute and exclusive right of sale and distribution of such article, and the preference of admission would be given to that exhibitor who was the sole proprietor. The Commissioners were not called upon to exercise this power in a single instance.

Metropolis. Although several Local Committees were formed in the Metropolis, the functions of rejection and selection of articles were performed by a united action of all the several Committees. Each Committee nominated Commissioners to represent a particular department of the Exhibition, who met together to consider the merits of the individual claims for space referred to them.

Such was the course of action by which the articles of British exhibitors were admitted to the Exhibition, and subjected to a preliminary judgment. Imperfect as it necessarily was, the general effect of it was satisfactory, and kept out of the Exhibition many unsuitable articles. Practically the system worked well, and there is no doubt that the Exhibition, as a whole, is a fair representation of the present state of British industry. An examination of the list of exhibitors shows that very few names indeed of artists or manufacturers of eminence are absent. It is probable, however, that there are fewer novelties in mechanical inventions than there would otherwise have been, had the Legislature provided against piracy of them at an earlier period than April, 1851.

The Building. It is now time to speak of the origin of the Building, and of its general features, so far as they have influenced the system which has been adopted in classifying and arranging the articles in it. An account of its scientific construction will be found in another part of this volume.

As early as January, 1850, the Commission named a Committee "for all matters relating to the Building," consisting of—

The Duke of BUCCLEUCH.
The Earl of ELLESMERE.
Mr. BARRY, R.A.
Mr. CUBITT, Pres. Inst. C.E.
Mr. STEPHENSON.
Mr. COCKERELL, R.A.
Mr. BRUNEL.
Mr. DONALDSON.

Mr. CUBITT was elected Chairman of this Committee, and from the earliest period to the opening of the Exhibition, has given daily and unremitting attention to the subject, at great personal sacrifice of his valuable time. On the 21st of February, 1850, the Building Committee reported favourably on the fitness of the present site in Hyde Park, which had been suggested in the early stages of the undertaking, and for the use of which it had been already announced that HER MAJESTY's permission had been obtained. The Committee ventured at once to recommend that upwards of 16 acres should be covered in; a bold step at that time (21st February), when no data whatever of the space likely to be filled had been received (*Min.* vii., p. 5). It was their opinion that it was desirable to obtain suggestions, by public competition, as to the general arrangements of the ground plan of the Building, and public invitations were accordingly issued. They also reported that when a plan for the general arrangement should have been obtained and approved, they would invite, by a second public notice, designs accompanied by tenders, from the builders and manufacturers of the United Kingdom, for the construction of the Building, in the form, and according to the general arrangement, which should be fixed upon. In answer to the invitation to send in plans, upwards of 245 designs and specifications were submitted. Of these 38 were contributed by foreigners: France sending 27; Belgium 2; Holland 3; Hanover 1; Naples 1; Switzerland 2; Rhein Prussia 1; Hamburg 1; 128 by residents in London and its environs; 51 by residents in provincial towns of England; 6 by residents in Scotland; 3 by residents in Ireland; and 7 were anonymous. All these plans were publicly exhibited during a month, from the 10th of June, at the Institution of Civil Engineers, Great George Street, Westminster. The Building Committee reported on the merits of them, selecting two lists of the competitors. They considered the one "entitled to favourable and honourable mention," and the second "entitled to further higher honorary distinction." But they accompanied their report with the important announcement, that in their opinion there was no "single plan so accordant with the peculiar objects in view, either in the principle or detail of its arrangement, as to warrant them in recommending it for adoption" (*Min.* xvii., p. 6). The Committee, therefore, submitted a plan of their own, and assisted by Mr. Digby Wyatt, Mr. Charles Heard Wild, and Mr. Owen Jones, they prepared extensive working drawings, which were lithographed. They issued invitations for tenders to execute works in accordance with them, requesting from competitors, in addition, such suggestions and modifications, accompanied with estimates of cost, as might possibly become the means of effecting a considerable reduction upon the general expense. In the actual instructions they stipulated that tenders, in which changes were proposed, would be only entertained provided they were "accompanied by working drawings and specifications, and fully priced bills of quantities."

First plan.

The Building Committee published in detail the reasons, both of economy and taste, which had induced them to prepare plans for a structure of brick, the principal feature of which was a dome two hundred feet in diameter. Public opinion did not coincide in the propriety of such a building on such a site, and the residents in the neighbourhood raised especial objections. The subject was brought before both Houses of Parliament; and in the House of Commons, on the 4th July, 1850, two divisions took place on the question, whether the proposed site should be used at all for any building for the Exhibition. In the one division, the numbers in favour of the site were 166 to 47, and in the second 166 to 46. The Commissioners published, at considerable length, a statement of the reasons which had induced them to prefer the site, and there can be no doubt that the force of this document mainly influenced the large majority in both divisions.

Mr. Paxton's proposal.

Whilst the plan of the Building Committee was under discussion, Mr. Paxton was led, by the hostility which it had incurred, to submit a plan for a structure chiefly of glass and iron, on principles similar to those which had been adopted and successfully tried by him at Chatsworth. Messrs. Fox, Henderson, and Co., tendered for the erection of the Building Committee's plan, and, strictly in accordance with the conditions of tender, they also submitted estimates for the construction of the building suggested by Mr. Paxton, and adapted in form to the official ground plan. An engraving of Mr. Paxton's original design was published in the *Illustrated London News*, 6th July, 1850, which, when compared with the building that has been actually erected, will show what changes were subsequently made. The Commissioners having fully investigated the subject, finally adopted, on the 26th July, Messrs. Fox, Henderson, & Co.'s tender to construct Mr. Paxton's building, as then proposed, for the sum of £79,800. Considerable modifications, additions, and improvements in the architectural details were subsequently made, which have raised the proposed original cost of the building. As soon as the decision was made, fresh working drawings had to be prepared, and every means taken for expediting the works. These were carried on under the superintendence of Mr. Cubitt, assisted by Mr. D. Wyatt, Mr. O. Jones, and Mr. C. Wild.

The formal deed of contract was not signed until the 31st October, although the first iron column was fixed as early as the 26th September, 1850, the contractors having thereby incurred, in their preparations, a liability of £50,000 without any positive contract; in fact, great reciprocal confidence was manifested by the contracting parties. Whatever objections were entertained originally against the use of the site, gradually disappeared during the progress of the present building, and have become changed into positive approval and admiration, of the building itself and assent to the particular location of it. It should, however, be stated that a deed of covenant, to remove the building and give up the site within seven months after the close of the Exhibition, namely before the 1st June, 1852, has been entered into between Her Majesty and the Commissioners. The deed was sealed on the 14th November, 1850.

At a very early period the Commissioners resolved that the whole space of any building should be equally divided, and that one-half should be offered to Foreign countries, and the other reserved to Great Britain and her colonies. And almost simultaneously with this decision, before the plans of any building were settled, offers were made to foreign countries, assuring them more than 210,000 superficial feet of net exhibiting space. But after the ground plan had been settled, and a calculation had been made of the amount of space unavailable for exhibition that was absorbed by the transept, the avenues, the courts and offices, &c., it became evident that the remaining space, after deducting what had been assured to foreigners, was considerably less than the proportion due to Great Britain and her colonies, and much below the demands and wants of British exhibitors. It was at first suggested that an additional structure should be erected to accommodate the agricultural implements, outside the building, but it was found that reasons both of economy and of management greatly preponderated in favour of building an additional gallery, which was accordingly done.

Classification and arrangement of articles.

In order to settle the positive arrangement of articles in the building, it became necessary to prepare a more precise system of classification than that furnished by the classified list of admissable objects which the Commissioners had first issued. The various systems which had been tried in the French Expositions proved that any system based upon an abstract philosophical theory was unsuitable, and particularly so to the present Exhibition. It was also desirable that the system of classification should be made conducive to the readiest mode of consulting the vast collection, both by the general visitor and by the juries, who would have to consider the merits of the whole. Dr. Playfair, to whom the Commissioners had confided the superintendence of the juries, suggested that whilst preserving the original quadrupartite divisions of the Exhibition into Raw Produce and Materials, Machinery, Manufactures, and Fine Arts, those subdivisions which had been determined by commercial experience, should be adopted as far as practicable, as the basis of the Classification. Eminent men of science, and manufacturers in all branches, were invited to assist in determining each one the boundaries of his own special class of productions; and it was resolved, for the purposes of the jury, to adopt thirty broad divisions, and to induce as far as practicable the application of this classification to all articles—both British and Foreign; always, however, bearing in mind the fundamental rule, that the productions of an exhibitor would not be separated, except in very extreme cases. Accordingly, with few exceptions, all articles have been divided into the following thirty classes.

To save repetition, the numbers of the jurors which have been since assigned to each class are here given.

SECTION I. Raw Materials and Produce,—illustrative of the natural productions on which human industry is employed.

	No. of Jurors.
1. Mining and Quarrying, Metallurgy, and Mineral Products	8
2. Chemical and Pharmaceutical processes and products generally	8
3. Substances used as food	6
4. Vegetable and Animal Substances used in manufactures, implements, or for ornament	8

SECTION II. Machinery for Agricultural, Manufacturing, Engineering, and other purposes and Mechanical Inventions,—illustrative of the agents which human ingenuity brings to bear upon the products of nature.

	No. of Jurors.
5. Machines for direct use, including carriages, Railway and Naval Mechanism	12
6. Manufacturing Machines and Tools .	12
7. Mechanical, Civil Engineering, Architectural, and Building Contrivances	8
8. Naval Architecture, Military Engineering and Structure, Ordnance, Armour and Accoutrements	8
9. Agricultural and Horticultural Machines and Implements (exceptional).	
10. Philosophical Instruments and Miscellaneous Contrivances, including processes depending upon their use, Musical, Horological, Acoustical and Surgical Instruments	12

SECTION III. Manufactures,—illustrative of the result produced by the operation of human industry upon natural produce.

Designs for Manufactures are admitted in the same section with the class of articles for which they are proposed.

	No. of Jurors.
11. Cotton	10
12. Woollen and Worsted	12
13. Silk and Velvet	10
14. Manufactures from Flax and Hemp .	10
15. Mixed Fabrics, including Shawls . .	12
16. Leather, including Saddlery and Harness, Skins, Fur, and Hair . . .	10
17. Paper, Printing, and Bookbinding . .	8
18. Woven, spun, felted, and laid Fabrics, when shown for Printing and Dyeing	10
19. Tapestry, including Carpets and Floor Cloths, Lace and Embroidery, fancy and industrial Works	10
20. Articles of Clothing for immediate, personal, or domestic use	8
21. Cutlery, Edge Tools and Hand Tools, and Surgical Instruments	6
22. General Hardware	12
23. Works in precious Metals, Jewellery, and all articles of luxury not included in the other classes . . .	8
24. Glass	8
25. Ceramic Manufacture, China, Porcelain, Earthenware, &c.	8
26. Decoration Furniture and Upholstery, Paper Hangings, Papier Maché, and Japanned Goods	12
27. Manufactures in Mineral Substances, used for building or decorations, as in Marble, Slate, Porphyries, Cements, Artificial Stones, &c. . . .	6
28. Manufactures from Animal and Vegetable Substances, not being woven, felted, or laid	6
29. Miscellaneous Manufactures and Small Wares	10

SECTION IV.

30. Fine Arts, Sculpture, Models, and the Plastic Arts generally, Mosaics, Enamels, &c.—illustrative of the taste and skill displayed in such applications of human industry . . .	12

It had been originally contemplated by the Commissioners, that the arrangement of the whole Exhibition should be, not merely on the basis of the four sections, but that each similar article should be placed in juxtaposition without reference to its nationality, or local origin. To effect this, in so vast an Exhibition and within the short period of two months allowed for the arrangement, it was absolutely necessary to know, before the arrival of the articles, the approximate amount of space each would be likely to occupy—so that each on its arrival might be placed as nearly as possible in its appointed spot. But the event proved that this information, particularly in the case of Foreign countries, was unattainable.

A request was made that each Foreign country should inform the Commis-

Geographical arrangement for Foreign and Colonial articles.

sioners, on or before the 1st of September, what space would be likely to be occupied respectively by its raw materials, its machinery, its manufactures, and fine arts; but only Austria, Belgium, Zollverein, and North Germany complied with this request, and furnished the information in sufficient detail. The great distance of other countries rendered the transmission of the information impossible, and practically it was not known what articles many very important countries would send, until they actually arrived. No choice remained but to adopt a geographical arrangement; and it was not until so late a period as the month of December that the Commissioners were enabled to decide the principles upon which the articles should be arranged in the Building. Circumstances connected with the form of the Building itself, the absence of the necessary information from Foreign countries, the great pressure for time, and above all the vital importance of punctually opening the Exhibition on the first of May, induced the division of the ground floor of the Building into two parts—the one being awarded to Foreign countries, and the other to the British colonies and the United Kingdom.

Allotment of space and position in the building.

The productions of the United Kingdom and the British colonies are generally grouped *westward* of the central transept. The productions of each foreign country are placed together *eastward* of the transept—except machinery in motion, which, on account of the motive power being at the *north-west end* of the building, is placed in that part of the building. The productions of each country are classified nation by nation, and as far as practicable into the thirty classes already mentioned. The position of each country is determined in the building by its own latitude. As a general rule, machinery is placed at the *north* side, and raw materials and produce brought to the *south* side of the building. The intermediate parts are occupied by manufactures and fine arts. There is hardly any choice in respect of *light*, which is nearly the same in all parts of the building. The *south* side, as well as the roof of the building both in the *north* and *south* sides, is covered with canvas. The sides of the upper and the gallery tier on the *north* are not so covered. As a general rule applicable both to foreign countries and the United Kingdom, space was allotted on the following data:—on the ground floor, each area of 24 feet by 24 feet containing 576 feet superficial, was accounted as yielding exhibiting area of 384 feet, it being considered that 192 feet would be a sufficient allowance for passages. The width of these was determined by experiments in the building and by experience of those in the British Museum, in the Soho Bazaar, &c. In the gallery, half of each area was deducted for passages, and the other half, or 288 feet, assigned as exhibiting space. If the exhibitor wished to have more passage-room, then he was obliged to obtain it by deducting it from his exhibiting space: and every exhibitor, desiring to attend himself, or by his representative, during the Exhibition, had to deduct the sitting or standing space for such attendant from the superficial floor or counter-space allotted to him.

System of passages.

A glance at the plan shows the adoption of a simple system of main passages. There is a central avenue 72 feet wide running from east to west, which is partially used to display both works of art and remarkable specimens of manufacture, and likewise to afford sitting room; parallel to this on each of the north and south sides are two uninterrupted passages 8 feet wide, one extending the length of the building and the other taking the circuit of the walls on each side. Besides the transept there are six main passages 8 feet wide, running from *north* to *south*. These were established as passages which must not be infringed upon:

portions of the building being then assigned to Foreign countries and to groups of exhibitors, a considerable latitude was permitted to them in arranging the other passages; at the same time, as the erection of the second gallery brought the whole building into a system of courts, spaces in the form of courts were allotted to Foreign countries, home districts, and classes of objects, and every one was encouraged to preserve them as much as possible. Thus on the British side, at the north there are the several machinery courts—the carriage court—the mineral court—the paper court—the miscellaneous court—the East India court; whilst at the south, there are three courts respectively for printed fabrics, for flax and woollen, and mixed fabrics:—furniture has its court, so have the manufactures of Birmingham and Sheffield—agricultural implements have an extensive court, and there are courts for mediæval furniture, for sculpture, for Canada and colonies, and the East Indies; on the east or Foreign side, almost every country has one or more courts,—France having eight, Austria six, &c.

Spaces of the requisite dimensions having been set apart to receive the productions of the Colonies and each Foreign country, the charge of these departments, as well as the arrangement of the productions, was handed over to each commissioner or agent representing such Colonies or Foreign country.

Arrangement of British articles.

On account of the vast magnitude of the building, of the shortness of time available for arrangement after the completion of the building, which as the event proved was hardly a week before the opening, and of the delay in sending the goods, it was foreseen by the Executive Committee that it would be necessary to arrange the Foreign productions geographically and the whole of the British Exhibition, not by means of the articles themselves, but of descriptions of them, and to map out the whole space before the articles themselves arrived. Not a few of these descriptions were in the first instance most vague; the exhibitor desiring to reveal as little as possible of the specific character of his articles. Many exhibitors demanded space for "fabrics," without specifying whether they were even woven or plastic. Others returned "woven fabrics," leaving it doubtful whether they were made of cotton, wool, or flax; each forming a separate class. The demands for space, merely for "inventions" and "machines," were numerous. Hence, there have crept in some errors in arrangement which would have been avoided had the description been more precise. Another source of difficulty has been the miscalculations of the amount of space which exhibitors really wanted. So frequently was the meaning of the term "superficial" and "square" feet misunderstood; so often were the expressions "horizontal" and "vertical" space disregarded or confounded, that in planning the arrangement of the Exhibition the difficulties of the Executive Committee have been great, and mistakes inevitable. One instance will afford a sufficient illustration. An important manufacturing town demanded 9,000 feet of wall or vertical space for the exhibition of its shawls, but when the demand came to be investigated, it was found to mean a demand for 900 feet of frontage on the wall, 10 feet high, and 3 feet deep—practically a demand for 27,000 superficial feet—to be arranged in such a way as would occupy half the length of the whole Exhibition! This demand of 27,000, was eventually compressed within 1,800 superficial feet of horizontal space, and submitted to, it must be admitted, with good-natured forbearance. Indeed, it may be said, that whilst almost every exhibitor desired some kind of special arrangement, convenient to himself, but inconvenient to every body else, almost every one submitted to a curtailment of space, and a constraint on his wishes, with a patience that greatly lightened the labours of the Executive Committee. In fact, owing to these circumstances, inevitable in such a work, without precedent or experience, and to the very late period at which some demands for space were made, it was only possible to make an approximate guess at the space which each of the classes of goods of the United Kingdom would occupy, and to leave a considerable margin for adjustments.

It should be borne in mind that every Foreign country was able to regulate the character of the arrangement by the articles themselves. The whole of its articles were first collected, and then the arrangement settled. Every Foreign country, in this respect, stood in the same position as an individual British exhibitor; but on the British side, the general arrangement, and almost the position of each of the 7,000 exhibitors, were necessarily fixed before the articles were brought into the building. An elaborate classified list of subjects included in each of the 30 classes was prepared, and recommended as a basis of arrangement to exhibitors, though, from the causes already stated, the systematic classification could not be carried out in so complete a manner as was desired.

At the British side, every exhibitor had entire control over his own allotment, the Commissioners, from an early period, having decided that each exhibitor was at liberty to arrange such articles in his own way, so far as was compatible with the convenience of other exhibitors and of the public. When the exhibitor's wishes involved expense, the exhibitor defrayed it himself. Glass cases, frames, and stands of peculiar construction, and similar contrivances for the display or protection of the goods exhibited, were provided by the person requiring them at his own cost. Persons who wished to exhibit machines, or trains of machinery in motion, were permitted to do so. The Commissioners found steam not exceeding 30 lbs. per inch gratuitously to the exhibitors, and conveyed it in clothed pipes to such parts of the building as required steam power. Arrangements were made to supply water at a high pressure gratuitously to exhibitors, who had the privilege of adapting it to the working of their machinery, &c. And the Chelsea Water-works contracted to supply 300,000 gallons of water per day, at the rate of £50 per month.

Catalogues.

It was decided that two Official Catalogues should be prepared and published by the authority of the Commission; the one of a large size, containing full notices of everything that the exhibitor desired to state, and the other an abridgment containing the names of the exhibitors only, with a very general summary of the articles they exhibited. The right of printing and publishing these was offered for competition. The contractors were at liberty to fix the price of the large Catalogue. The smaller Catalogue was to be sold at 1*s*., and the contractors were bound to pay 2*d*. for every copy sold to the funds. Several parties tendered. The offer of Messrs. SPICER BROTHERS, and Messrs. CLOWES and SONS, as the highest, was accepted; the amount of their offer being £3,200 It was also provided (*Min.* xxix., p. 1), that should the number sold exceed 500,000 of the small edition, and 5,000 of the large, then the contractors should give a further sum for all sold over and above those numbers. The contract was sealed 6th January, 1851.

Insurance from fire.

The insurance of goods from fire, or other kinds of accidents, and the responsibility for all losses, devolved upon the exhibitors. The Metropolitan Fire

Brigade took charge of the safety of the Building from fire. With the permission of the Secretary of State for the Home Department, the responsibility for the whole of the police arrangements was placed upon Mr. MAYNE, the Chief Commissioner of Police. The Commissioners expressed their willingness to pay the sum of £5,043 19*s.* 4*d.*, in consideration of the Commissioners of Police providing the force necessary to be employed outside the Exhibition Building (viz., at the various entrances and approaches within Hyde Park), for the period of six months, from 1st March to 1st September, stipulating, however, that should it appear that the additional force which it was contemplated to provide was greater than was actually required, a proportionate reduction was to be made. The Commissioners left the question of the police force necessary for the interior watching of the building, and of the amount of expense in connection with it, in the hands of Her Majesty's Government, "in the full assurance that the utmost economy will be observed that is compatible with the satisfactory execution of that duty" (*Min.* xxxiii., p. 2). **Police.**

Refreshments. The Commissioners considered that it would conduce to the convenience of visitors to permit light and moderate refreshments to be obtained and consumed in *certain prescribed parts* of the building but that it would be inconsistent with the nature of the Exhibition to allow the building to assume the character of an hotel, tavern, or dining-rooms. In the Central Area are sold ices, pastry, sandwiches, patties, fruits, tea, coffee, chocolate, cocoa, lemonade, seltzer and soda water; whilst in the Eastern and Western Areas are sold bread, butter and cheese, tea, coffee, chocolate, cocoa, ginger beer, spruce beer, and similar drinks, together with the other articles sold in the Central Area. No refreshments are to be taken out of the Areas. No wines, spirits, beer, or intoxicating drinks are permitted to be sold to the visitors. The privilege of supplying refreshments on these terms was put up to competition, and the tender of Messrs. SCHWEPPE, wherein they offered a sum of £5,500 for the privilege, was accepted. **Waiting rooms, &c.** Waiting rooms and conveniences have likewise been provided at a moderate charge at each of the refreshment areas.

With the view of affording information in respect of lodgings for the working classes which might be required in London, a register was opened, in which the names and addresses of persons disposed to provide accommodation for artizans from the country whilst visiting the Exhibition were entered. In doing this, the Commissioners intimated that they did not propose to charge themselves in any respect with the management, but simply to afford information. It was thought most expedient that the public should be led to make its own arrangements; and the object which the Commissioners had in view was simply to call public attention to the subject. Various kinds of organizations have arisen to meet any demands which may arise. The superintendence of this subject was intrusted to Colonel REID and Mr. ALEXANDER REDGRAVE.

Railway facilities. The principal railways agreed to afford some increased public accommodation during the Exhibition. Each Railway Company, both in the carriage of goods and passengers, and in the conveyance and delivery of articles intended for the Exhibition, allowed a deduction of one-half of the railway charge to exhibitors, subject to certain conditions. In order to encourage the early formation of "Subscription Clubs" in the country, to enable the labouring classes to travel to London and back during the Exhibition, the Railway Companies undertook to convey all persons so subscribing to local clubs at a single railway fare for both journeys, up and down, which should in no case exceed the existing fare by Parliamentary trains for the journey in one direction, with some abatement for longer distances, subject to the following conditions, which they published in September, 1850:—

> That in respect of journeys to London, the first 100 miles shall always be charged as 100 miles, and where the distance shall exceed 100 miles, an allowance in the fare be made on the following scale:—
>
> For the first excess 100 miles, 1–5th, or 20 per cent. be allowed.
> For the second excess 100 miles, 3–10ths, or 30 per cent. be allowed.
> For the third excess 100 miles, 2–5ths, or 40 per cent. be allowed.
> For the fourth excess 100 miles, ½ or 50 per cent. be allowed.
>
> Thus for instance:—
>
> A distance of 150 miles will be paid for as 140 miles.
> „ 200 „ „ 180 „
> „ 300 „ „ 250 „
> „ 400 „ „ 310 „
> „ 500 „ „ 360 „
> and in like proportion between the respective distances.

Regulations respecting the admission of visitors.

The consideration of the admission of Visitors was, in the first instance, referred to a Committee, and upon the recommendations of their Report, the Commissioners published decisions, in which they stated that their attention had been principally directed to the following points:—

1st. The necessity of making such arrangements as shall secure the convenience of the public visiting the Exhibition, whether for study and instruction, or for the more general purposes of curiosity and amusement. 2nd. The due protection and security of the property deposited in the building. 3rd. The effective control over the number of visitors, while the servants and officers intrusted with the maintenance of order and regularity in the building are comparatively inexperienced in their duties. 4th. The necessity of maintaining the self-supporting character of the Exhibition, and of defraying the liabilities incurred. 5th. The desire of the Commissioners to render the Exhibition accessible to all persons at the lowest possible charge, and with the least delay which a due regard to the preceding considerations will admit.

Having these objects in view, Her Majesty's Commissioners have determined to adopt the following regulations:—

The Exhibition will be open every day (Sundays excepted).

The hours of admission and other details will be announced at a subsequent period.

The charges for admission will be as follows:—

Season tickets for a gentleman . . .	£3	3	0
Season tickets for a lady . . .	2	2	0

These tickets are not transferable; but they will entitle the owner to admission on all occasions on which the Exhibition is open to the public.

The Commissioners reserve to themselves the power of raising the price of the season tickets when the first issue is exhausted, should circumstances render it advisable. On the first day of exhibition season tickets only will be available; and no money will be received at the doors of entrance on that day.

On the second and third days the price of admission on entrance will be (each day)	£1	0	0
On the fourth day of exhibition	0	5	0
To be reduced on the twenty-second day to . .	0	1	0

From the twenty-second day the prices of admission will be as follows:—

On Mondays, Tuesdays, Wednesdays, and Thursdays in each week	1*s.* 0*d.*
On Fridays	2*s.* 6*d.*
On Saturdays	5*s.* 0*d.*

No change will be given at the doors. This regulation is necessary to prevent the inconvenience and confusion which would arise from interruption or delay at the entrances. Should experience in the progress of the Exhibition render any alteration in these arrangements necessary, the Commissioners reserve to themselves the power of making such modifications as may appear desirable, of which due and timely notice, however, will be given to the public. At the first opening of the Exhibition, the hours of admission were fixed from 10 A.M. till 6 P.M.

Upon the question how far, and in what instances, any parties should be furnished with free admissions, the Committee reported,—

That it is very desirable that that privilege should be restricted to as few cases as possible, and feeling the importance of carrying out to the greatest practicable extent a regulation of this nature, they would submit whether it might not be expedient that the Commissioners should place themselves in the same position as the public in general with regard to the admission to the Exhibition. The members of the Executive Committee have expressed their wish to subject themselves to the same conditions as the Royal Commissioners in this respect.

The following are the cases in which the Committee would recommend that an exception to the general rule should be made, and free admissions granted:—

1st. Persons in the employment of, and provided with tickets issued by the Executive Committee, such as the heads of sectional departments, the clerks, the watchers, the cleaners, the Police, the Sappers and Miners. 2nd. Servants of Foreign Commissioners and of exhibitors admitted under the provisions of the 14th published decision of the Commissioners for the purpose of watching the goods sent by their employers, or explaining them to visitors; such servants being provided with tickets issued by the Executive Committee under strict regulations to be hereafter laid down. 3. The press, both metropolitan and provincial; the tickets in both cases admitting the editor or his representative. 4th. The juries, on the production of tickets that have been issued and registered by the Executive Committee, on certain days to be hereafter fixed by the Executive Committee.

And the power of carrying these rules into effect was given to the Executive Committee.

The inauguration of the Exhibition took place on 1st May, in accordance with the arrangements laid down in the accompanying document, which was published by the Commissioners:—

Her Majesty having signified her royal pleasure that arrangements should be made to enable Her Majesty to gratify a wish very generally expressed on the part of the public, to be present at a ceremony by which Her Majesty should open the Exhibition of the Works of Industry of all Nations, on the 1st of May, Her Majesty's Commissioners hereby give notice that the programme of this ceremony, and the regulations under which the holders of season tickets will be admitted, are as follow:—

Exhibitors' attendants who have been sanctioned by the Executive Committee will be admitted between the hours of 8 and 9 o'clock, at doors specified on their cards, and will immediately take their places by the counters or objects exhibited by their employers.

Holders of season tickets will be admitted at all doors on the east, south, and west of the building, between the hours of 9 and half-past 11 o'clock, and will be allowed to take their places, subject to police regulations, in the lower part of the building, and in the galleries, except the parts railed off in the nave and transept.

A platform will be raised to the north of the centre of the transept, on which a chair of state will be placed.

Her Majesty's Commissioners will assemble at half-past 11 o'clock in the transept, opposite the platform, together with their Executive Committee and the Foreign Acting Commissioners, in full dress or in plain evening dress.

His Grace the Archbishop of Canterbury, Her Majesty's Ministers, the great Officers of State, and the Foreign Ambassadors and Ministers, will take their places on the platform to the right and left of the chair of state, in full dress, also at half-past 11 o'clock.

Her Majesty, proceeding in State, with the royal family, foreign guests, &c., and her and their suites from Buckingham Palace up Constitution Hill, and down Rotten Row, will enter the Exhibition building by the north entrance precisely at 12 o'clock. She will ascend the platform and take her seat in the chair of state.

On Her Majesty's arrival a choir will sing "God Save the Queen."

On the Queen taking her seat His Royal Highness Prince Albert will join the Royal Commissioners, and when the music has ceased proceed at their head to the platform, and read to Her Majesty a short report of the proceedings of the Commission up to that time, which he will then deliver to Her Majesty, together with the catalogue of the articles exhibited. Her Majesty will return a gracious answer, handed to her by the Secretary of State; after which His Royal Highness Prince Albert will take his place again by the side of Her Majesty.

His Grace the Archbishop of Canterbury will then say a prayer, invoking God's blessing upon the undertaking, followed by a short anthem sung by the choir.

A Royal procession will then be formed, preceded by the Commissioners, which will turn to the right, move to the west end of the nave by its north side, return to the east end of the nave by its south side, including the south end of the transept, and come back to the centre along the north side of the nave; thus enabling all those present, who will be expected to keep the places which have been assigned to them, to see Her Majesty and the procession.

During the procession the organs appointed will play marches, taking the music up at the Queen's approach.

On Her Majesty's return to the platform the Queen will declare "the Exhibition opened;" which will be announced to the public by a flourish of trumpets and the firing of a Royal Salute on the north of the Serpentine; whereupon the barriers, which had kept the nave clear, will be thrown open, and the public will be allowed to circulate.

Her Majesty will then return to Buckingham Palace by the route by which she came.

All the doors, which will have been closed at half-past eleven o'clock, will, upon Her Majesty's departure, be opened again.

Principles on which the prizes were awarded.

In announcing the PRIZES, the Commissioners laid down certain general principles for the guidance of the Juries, which they published as follows:—

In the department of RAW MATERIALS AND PRODUCE, for instance, prizes will be awarded upon a consideration of the value and importance of the article, and the superior excellence of the particular specimens exhibited; and in the case of prepared materials, coming under this head of the Exhibition, the Juries will take into account the novelty and importance of the prepared product, and the superior skill and ingenuity manifested in the process of preparation.

In the department of MACHINERY, the prizes will be given with reference to novelty in the invention, superiority in the execution, increased efficiency, or increased economy, in the use of the article exhibited. The importance, in a social or other point of view, of the purposes to which the article is to be applied, will also be taken into consideration, as will also the amount of the difficulties overcome in bringing the invention to perfection.

In the department of MANUFACTURES, those articles will be rewarded which fulfil in the highest degree the conditions specified in the sectional list, viz.:—Increased usefulness, such as permanency in dyes, improved forms and arrangements in articles of utility, &c. Superior quality, or superior skill in workmanship. New use of known materials. Use of new materials. New combinations of materials, as in metals and pottery. Beauty of design in form, or colour, or both, with reference to utility. Cheapness, relatively to excellence of production.

In the department of SCULPTURE, MODELS, and the PLASTIC ART, the rewards will have reference to the beauty and originality of the specimens exhibited, to improvements in the processes of production, to the application of art to manufactures, and, in the case of models, to the interest attaching to the subject they represent.

These general indications are sufficient to show that it is the wish of the Commissioners, as far as possible, to reward all articles in any department of the Exhibition, which may appear to competent judges to possess any decided superiority, of whatever nature that superiority may be. It is the intention of the Commissioners to reward excellence in whatever form it is presented, and not to give inducements to the distinctions of a merely individual competition. Although the Commissioners have determined on having three medals of different sizes and designs, they do not propose to instruct the Juries to award them as first, second, and third in degree for the same class of subjects. They do not wish to trammel the Juries by any precise limitation; but they consider that the Juries will rather view the three kinds of medals as a means of appreciating and distinguishing the respective characters of the subjects to be rewarded, and not of making distinctive marks in the same class of articles exhibited. They fully recognise that excellence in production is not only to be looked for in high-priced goods, in which much cost of labour and skill has been employed, but they encourage the exhibition of low-priced fabrics, when combining quality with lowness of price, or with novelty of production. They can readily conceive that Juries will be justified in giving the same class medal to the cheapest calico prints made for the Brazilian or South American market, as they would to the finest piece of *Mousseline de Soie* or *Mousseline de Laine*, if each possessed excellence of its own kind.

All persons, whether being designers or inventors, the manufacturers or the proprietors of articles, will be allowed to exhibit; but they must state the character in which they do so. They may also state the names of all or any of the parties who have aided in the production. In awarding the prizes, however, it will be for the Juries to consider, in each individual case, how far the various elements of merit should be recognised, and to decide whether the prize should be handed to the exhibitor, or to one or more of those who have aided in the production.

Lastly, the Commissioners, in announcing their intention of giving medal prizes, do no propose altogether to exclude pecuniary grants, either as prizes for successful competition, or as awards under special circumstances, accompanying, and in addition to the honorary distinction of the medal. There may be cases in which, on account of the condition of life of the successful competitor (as for instance, in the case of workmen) the grant of a sum of money may be the most appropriate reward of superior excellence; and there may be other cases of a special and exceptional nature, in which, from a consideration of the expe incurred in the preparation or transmission of a particular article entitled to a prize, c bined with a due regard to the condition and pecuniary circumstances of the party exhib a special grant may with propriety be added to the honorary distinction. The Com sioners are not prepared, for the present, at least, to establish any regulations on heads. They consider it probable that a wide discretion must be left to the Juries, hereafter appointed, in respect to the award of money prizes, or the grant y in honorary distinctions; it being understood that such discretion is to be exercised under the superintendence and control of the Commission.

Articles marked "Not for Competition" cannot be admitted.

Medals obtained by competition.

The Commissioners decided to select bronze for the material in which the medals should be executed, considering that metal to be the better calculated than any other, for the development of superior skill and ingenuity in the medallic art, and at the same time the most likely to constitute a lasting memorial of the Exhibition. There are three bronze medals, of different sizes and designs, which were obtained by public competition. Three prizes of 100*l.* each, were awarded for the three designs of the reverses, which appeared the most meritorious, to the following artists:

M. HIPPOLYTE BONNARDEL, Paris.
Mr. LEONARD C. WYON, London.
Mr. G. G. ADAMS, London.

Three prizes of 50*l.* each were also given for the three best designs not accepted, as follows:

Mr. JOHN HANCOCK, London.
Mons. L. WIENER, Brussels.
Mr. GAYRARD, Paris. (*Min.* xxii., p. 2).

One hundred and twenty-nine models were received, and were exhibited in the rooms of the Society of Arts. The obverses of the medals are heads of HER MAJESTY the QUEEN, and HIS ROYAL HIGHNESS THE PRINCE ALBERT, executed by W. WYON, R. A., the medallist of the Mint, after the type of the Syracusan medals.

The inscriptions.

The Committee appointed (consisting of the Hon. W. E. GLADSTONE, the Lord LYTTELTON, the Hon. T. B. MACAULAY, and the Rev. H. G. LIDDELL, Head Master of Westminster School) to suggest inscriptions for the Prize Medals, recommended, for the medal to be executed after design No. 1, the following line, very slightly altered, from MANILIUS (Astronomicon, v. 737):—

"Est etiam in magno quædam respublica mundo."

For the medal from design No. 2, the following line from the first book of the Metamorphoses of OVID (v. 25):—

"Dissociata locis concordi pace ligavit."

For the medal from design No. 3, the following line from CLAUDIAN (Eidyll., vii. 20):—

"Artificis tacitæ quod meruere manus."

Constitution of the juries.

Under the general conditions by which the juries were constituted, it was provided that there should be one jury to each of the 30 classes into which the Exhibition had been divided. The number of jurors in each jury was determined by the amount of articles exhibited in each class, and the greater or less diversity of the subjects included in it, but no abstract idea of the relative importance of the classes was involved in the numbers attached to them. The list of the 30 classes has already been given (*see* p. 23), with the number of jurors appointed to each class. In addition to the juries there described, it was found necessary to appoint three sub-juries; one subordinate to Class V., for carriages, and two subordinate to Class X., viz., for musical and for surgical instruments. The increased number of jurors for these three sub-juries was 22, of whom half were foreigners

To facilitate the working, especially with reference to the foreign jurors, the 30 classes were collected into six groups:—

Classes 1, 2, 3, 4, forming the group of Raw Materials.

Classes 5, 6, 7, 8, 9, 10, forming the group of Machinery.

Classes 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, forming the group of Textile Fabrics.

Classes 21, 22, 23, 24, 25, forming the group of Metallic, Vitreous, and Ceramic Manufactures.

Classes 26, 27, 28, 29, forming the group of Miscellaneous Manufactures.

The thirtieth class forming the group of Fine Arts.

A classified list of subjects under the province of each jury was prepared, and formed the limitation to each class, being the same as that upon which the arrangement of articles in the building had been made.

The constitution of juries was determined to be as follows:—The jury in general consisted of an equal number of British subjects and of Foreigners. If Foreign Commissions did not send a sufficient number of Foreigners to represent one-half of the jurors in each class, the deficient numbers might be completed by the appointment of British subjects, or be made up by the persons named by the Foreign Commissioners in London. Country as well as metropolitan districts were represented on the jury. Each jury was presided over by a chairman nominated by the Commissioners, and he was aided by a deputy chairman elected by the jury. Juries were able to appoint one of their own body as a reporter. The chairmen of the thirty juries were associated as a body, and called the "Council of Chairmen." In the absence of a chairman, the deputy-chairman took his seat at the Council. The Council of Chairmen was constituted, as far as practicable, of British subjects and Foreigners in equal numbers. The first and chief duties of the Council of Chairmen were to frame the rules for the guidance of the juries. The Council had to determine the conditions under which the 1st, 2nd, and 3rd class medals respectively were to be awarded, and to define the general principles to which it would be advisable to conform in the awards in the several departments of the Exhibition. It was the wish of the Commission that medals should be awarded to articles possessing decided superiority of whatever nature that superiority might be, and not with reference to a merely individual competition. The Juries were reminded that "the three classes of medals are intended to distinguish the respective characters of subjects, and not as first, second, and third in degree for the same class of subjects." It was the function of the Council of Chairmen to see that the awards of the individual juries were in accordance with the rules before they were considered final. The propriety of pecuniary grants to individual exhibitors were considered by the Commissioners only on the recommendation of the several juries, sanctioned by the Council of Chairmen.

Appointment of English jurors.

The mode of appointing the English jurors was as follows:—Those towns which exhibited to a considerable extent in any of the classes were invited to send a list of names of persons who would efficiently represent the knowledge of those classes as jurors. It was necessary to state according to the classified jury list, the subdivisions of the class with which the person recommended was specially acquainted; and all nominations were made in classes, and not in the aggregate.

As it was necessary to reduce the lists to the standard number for each jury, the Commission charged itself with this duty. Those persons who had been recommended as jurors, but who from the small numbers of the jury were not placed on it, might, on the application of a jury, be called in on special occasions to give aid, under the title of associates, but without a vote.

and Foreign jurors.

The nomination of the foreign jurors was conducted on a somewhat different principle. The Foreign Commissioners submitted, that a fuller representation of the foreigners of all nations in the body which it was proposed to constitute for the purpose of confirming the award of individual juries would be secured, by referring the awards for confirmation to a general meeting of the juries of *allied* subjects, according to the groupings already spoken of. And the Commissioners assented to this modification. The selection of jurors for each foreign country was of course left to that country; persons of skilled knowledge being chosen to represent those classes of objects in which the country was a considerable exhibitor. It was recommended that in cases where the Central Commission was too remote to obtain the nomination of the jurors in sufficient time, the Foreign Commissioners should put themselves into communication with the diplomatic representatives of their respective countries in London. The number of jurors allotted to each foreign country by the Commissioners, upon the suggestion of the Foreign Commissioners, was as follows:—Austria, 15; Zollverein, comprehending Bavaria, Prussia, Saxony, Wurtemburg, &c., 19; Belgium, 11; North Germany, comprehending Bremen, Hamburgh, and Hanover, 3; Denmark, 1; France, 32; Greece, 1; Holland, 2; Portugal, 2; Russia, 6; Italy, comprehending Sardinia and Tuscany, 6; Spain, 3; Sweden and Norway, 1; Switzerland, 4; Turkey, 3; United States, 21; Egypt, 2.

If exhibitors accepted the office of jurors, they ceased to be competitors for prizes in the class to which they were appointed, and these could not be awarded either to them individually, or to the firms in which they might be partners. Juries were at liberty to take evidence when a majority of the jury deemed it advisable, and to name the persons to be consulted. Jurors of another class might also be called in aid by a jury, when a knowledge involved in that class was required. Juries were empowered to act in matters of detail by sub-committees, but no award could be made except by the majority of the jury. Before a jury could finally make its awards, it was necessary they should have been submitted to a meeting of the juries of allied subjects, as indicated in the groups. These meetings of allied juries had power to confirm the award of the juries, and to investigate any disputed decisions. Before, however, the awards were published, it was requisite they should have been submitted to a Council, consisting of the chairmen of the juries, in order to secure uniformity of action, and a compliance with the regulations originally laid down by that body. The awards of a jury, when reported by the Council of Chairmen as being made in conformity to the rules, were final. The juries were aided in the general transaction of the business by a person named by the Royal Commissioners, who by himself, or by a deputy approved of by the Commission, was present at their deliberations, for the purpose of explaining the rules of the Commission. This nominee of the Commission, who was Dr. L. PLAYFAIR, did not have a vote in any of the juries, or at all interfere in the adjudication of awards.

The Exhibition is open to tell its own tale, and is now submitted to the judgment of the world. Conclusion.

All that has been done has been the work of a short and anxious period of sixteen months. During that time, Her Majesty's Commissioners have assembled together upwards of forty times, to discuss and determine all principles. When the Commissioners were not sitting, every important detail of action was considered by His Royal Highness, the President, and by Lord GRANVILLE, as Chairman of the Finance Committee. From time to time, as their services have been required, the most distinguished persons in art and science have met in Committees, liberally to afford their assistance to the Commissioners. These gentlemen, to whom the Exhibition is thus indebted, are named elsewhere; and it may be permitted to append a list of the staff, materially strengthened by officers of the Royal Engineers, both of Her Majesty's and the Honourable East India Company's service, which has carried the work into execution, and also to acknowledge the effective aid of the Sappers and Miners who have been permitted by the Master General of the Ordnance to bring their military discipline and business knowledge to aid in the arrangements of the Exhibition.

The work is done, and the collection made of the productions of 15,000 exhibitors, working with the ability God hath given them. To these we may say with St. Paul,—"In lowliness of mind let each esteem others better than themselves." And to spectators we may reiterate the hope expressed by the PRINCE, that "the first impression which the view of this vast collection will produce will be that of deep thankfulness to the Almighty for the blessings which he has bestowed upon us already here below; and the second, the conviction that they can be only realized in proportion to the help which we are prepared to render to each other—therefore, only by peace, love, and ready assistance, not only between individuals, but between the nations of the earth."

HENRY COLE.

Exhibition, Hyde Park,
28th April, 1851.

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(a) Agricultural Implements.

Hon. Dudley Pelham, M.P. (Deceased.)
Col. B. Challoner.
W. Miles, Esq., M.P.
Joseph Locke, Esq. M.P., F.R.S.
Philip Pusey, Esq., M.P., F.R.S.
Brandreth Gibbs, Esq.
H. S. Thompson, Esq.
J. V. Shelley, Esq.

Section III.—Manufactures.

Rt. Hon. W. E. Gladstone, M.P.
Alderman Thompson, M.P.
Richard Cobden, Esq., M.P.
Thomas Field Gibson, Esq.
Thomas Bazley, Esq.
John Gott, Esq.
Herbert Minton, Esq.
Apsley Pellatt, Esq.
R. Redgrave, Esq.,R.A.
J. R. Herbert, Esq., R.A.
H. J. Townsend, Esq.
J. Jobson Smith, Esq.
J. H. Marshall, Esq., M.P.
J. H. Vivian, Esq., M.P.
Professor Graham, F.R.S.
Professor Woodcroft.
Professor Cowper.
John Hardman, Esq.
H. T. Hope, Esq., M.P.
Sir John Guest, M.P.
Pascoe Grenfell, Esq., M.P.
J. D. Morries Stirling, Esq., F.R.S.E.
Sir John Boileau, Bart., F.R.S.

Section IV.—Sculpture, Models, and the Plastic Art.

Rt. Hon. the Earl of Aberdeen, K.T.,F.R.S.,Pr. S.A.
Rt. Hon. Viscount Canning.
Rt. Hon. Lord Ashburton.
Sir Richard Westmacott, R.A.
Sir Charles Lock Eastlake, P.R.A., F.R.S.
Charles Barry, Esq., R.A., F.R.S.
Charles Baring Wall, Esq., M.P., F.R.S.
Wm. Wyon, Esq., R.A.
Edward Hodges Baily, Esq., R.A., F.R.S.
D. Maclise, Esq., R.A.
Thomas Uwins, Esq., R.A.

LIST OF COMMISSIONERS, &c. APPOINTED ABROAD TO PROMOTE THE EXHIBITION OF 1851 IN LONDON.

FRANCE.

La Commission générale, instituée par arrêtés des 28 Février et 11 Mars 1850, s'est, dans sa séance du 16 Mars, divisée en 6 Commissions spéciales, dont voici les attributions et la composition :*

1° Commission des Affaires administratives et de la Correspondence.

M. Charles Dupin, de l'Académie des Sciences, Président de la Commission Générale.

M. de Lesseps, Directeur des Consulats et des Affaires Commerciales au Ministère des Affaires Etrangères.

M. de Lavenay, Secrétaire-Général du Ministère de l'Agriculture et du Commerce.

M. Monny de Mornay, Chef de la division de l'Agriculture.

M. Fleury, Chef de la division du Commerce Extérieur.

M. Delambre, Chef de la division du Commerce Intérieur.

M. Chemin-Dupontes, Chef du Bureau des Faits-Commerciaux, Secrétaire de la Commission Générale.

2° Commission des Arts Agricoles.

M. Hericart de Thury, de l'Académie des Sciences.

M. Tourret, Vice Président du Jury Central.

M. Payen, de l'Académie des Sciences.

M. Armand Seguier, de l'Académie des Sciences.

M. de Kergorlay, Membre de la Société Nationale et Centrale d'Agriculture.

M. Monny de Mornay.

3° Commission des Arts Mécaniques et de Précision.

M. Pouillet, de l'Académie des Sciences.

M. Armand Seguier, de l'Académie des Sciences.

M. Morin, de l'Académie des Sciences.

M. Combes, de l'Académie des Sciences.

M. Michel Chevalier, Ingénieur en Chef des Mines.

M. le Chatelier, Ingénieur des Mines.

4° Commission des Arts Chimiques et Métallurgiques.

M. Balard, de l'Académie des Sciences.

M. Hericart du Thury.

M. Payen.

M. Michel Chevalier.

M. Ebelmen, Directeur de la Manufacture Nationale de Sèvres.

M. le Chatelier.

5° Commission des Tissus.

M. Mimerel, Président de la Commission des Tissus au Jury Central.

M. Legentil, Président de la Chambre de Commerce de Paris.

M. Barbet, Membre du Jury Central de l'Industrie Nationale.

M. Sallandrouze de Lamornaix, Membre du Jury Central.

M. de Lavenay.

6° Commission des Beaux-Arts et Arts divers.

M. Fontaine, de l'Académie des Beaux Arts.

M. Leon de Laborde, de l'Académie des Beaux Arts.

M. Armand Seguier.

M. Ebelmen.

M. de Lavenay.

M. Delambre.

Dans une deuxieme séance qui a eu lieu le 20 courant, ont été élus Présidents des diverses Commissions:—

I. Commission Administrative	M. Charles Dupin.
II. Commission des Arts Agricoles	M. Hericart de Thury.
III. Commission des Arts Mécaniques et de Précision . .	M. Combes.
IV. Commission des Arts Chimiques et Métallurgiques	M. Hericart de Thury.
V. Commission des Tissus .	M. Legentil.
VI. Commission des Beaux Arts et Arts divers	M. Fontaine.

Tous les renseignements destinés à la Commission doivent être adressés au Ministère de l'Agriculture et du Commerce.

BELGIUM.

President.—M. de Brouckere, Bourgmestre de la Ville de Bruxelles, Membre de la Chambre des Représentants, Président du Jury l'Exposition Industrielle de 1847.

Membres.—M. Bellefroid, Chef de la Division de l'Agriculture au Départment de l'Intérieur.

M. Benoit Faber, Délégué de la Chambre de Commerce de Namur.

M. Capitaine, Fabricant à Liège, délégué de la Chambre de Commerce de cette Ville.

M. Claes (Paul) de Lembecq, Agronome.

M. Kindt, Inspecteur pour les Affaires Industrielles, au Départment de l'Intérieur.

M. Kums, Fabricant à Anvers, délégué par la Chambre de Commerce de cette Ville.

M. Manilius, Membre de la Chambre des Représentants, délégué par la Chambre de Commerce de Gand.

M. [illegible], Fabricant à Tournay, délégué par la Chambre de Commerce de cette Ville.

M. Partoes, Directeur du Commerce Extérieur et des Consulats au Départment des Affaires Etrangères.

M. Quoilin, Secrétaire Général au Départment des Finances.

M. Romberg, Chef de la Division de l'Industrie au Départment de l'Intérieur.

M. Simonis, (Armand), Président de la Chambre de Commerce de Verviers.

M. Spitaels, (Ferdinand), Membre du Sénat, délégué par la Chambre de Commerce de Charleroy.

M. Van Hooff, Fabricant à Saint-Nicolas, délégué par la Chambre de Commerce de cette Ville.

M. Vercruyse-Bruneel, (H.), Fabricant à Courtray, délégué de la Chambre de cette Ville.

M. Verreyt, Fabricant à Bruxelles, délégué par la Chambre de Commerce de cette Ville.

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* Voir le Moniteur du 21 Mars 1850.

NETHERLANDS.

President—M. Jonkhur D. R. Givers Deynoot, Directeur de la Société pour l'Encouragement de l'Industrie à Haarlem, demeurant à Rotterdam.

Membres—M. le Docteur G. Simons, Directeur de l'Académie Royale à Delft.

M. D. C. Buchler, Membre de l'Institut Royal des Pays-Bas, Vice-Président de l'Académie Royale des Beaux Arts à Amsterdam.

AUSTRIA.—A Commission formed, consisting of the following Members:—

Präsident—Herr Andreas Ritter v. Baumgartner, k. k. geheimer Rath, Sections-Chef im Ministerium der Finanzen, Vice-Präsident der k. k. Akademie der Wissenschaften in Wien, &c.

Präsidentens-Stellvertreter—Herr Michael Ritter v. Spörlin, Fabriksinhaber, Mitglied der Wiener Handelskammer.

Vertreter der Ministerien—Herr Dr. Karl Hock, Ministerialrath im Ministerium des Handels.

Herr Dr. Moriz Ritter v. Besteneck, Sectionsrath im Ministerium der Finanzen.

Herr Joseph Kudernatsch, Sectionsrath im Ministerium des Bergbaues und der Landes-Cultur.

Schriftführer—Herr Heinrich Henking, Ministerial-Secretär. Commissions-Mitglieder für Nieder-Oesterreich.

Herr Theodor Hornbostel, Fabriksinhaber, Präsident der Wiener Handelskammer und des Nieder-Oesterreichischen Gewerbs-Vereines.

Herr Carl Rösner, Professor der Baukunst und provisorischer Präsident der k. k. Akademie der Künste in Wien.

Herr Carl Ritter v. Kleyle, Sections-Chef und Ministerialrath im Ministerium für Landes-Cultur.

Herr Adam Ritter v. Burg, k. k. Regierungsrath, Director des Polytechnischen Institutes und Vice-Präsident des Nieder-Oesterreichischen Gewerb-Vereines.

Herr Paul Sprenger, Sectionsrath der General-Baudirection.

Herr A. Steinheil, Sectionsrath im Ministerium des Handels.

Herr Jacob Regenhart, Kaufmann und Fabriksinhaber,
Herr Johann Mayer, Groszhändler und Fabriksinhaber,
Herr Ludwig Damböck, Fabriksinhaber,
Herr Joseph Zeisel, Fabriksinhaber,
Herr Ludwig Hardtmuth, Fabriksinhaber,
Mitglieder der Wiener Handelskammer.

Herr Gustav Höfken, Sectionsrath im Ministerium des Handels.

Herr Franz Freiherr von Leithner, k. k. Regierungsrath und Fabriks-Director.

Herr Alois Auer, k. k. Regierungsrath und Director der Staatsdruckerei.

Herr Anton Schrötter, Professor der Chemie, Mitglied der Akademie der Wissenschaften in Wien.

Herr Ludwig von Brevilliers, Fabriksinhaber.

Herr Georg Endris, Groszhandlungs-Dirigent.

Herr Theodor Gulchern, Fabriksinhaber.

Herr Carl Leistler, Tischlermeister.

Herr Matthaus Edler von Rosthorn, Gewerke.

Herr Heinrich D. Schmidt, Fabriksinhaber.

Herr Otto Schumann, Kaufmann.

Herr Dr. Wilhelm Schwarz, Secretär der Wiener Handelskammer.

Herr Emil Seybel, Fabriksgesellschafter.

Herr Johann B. Streicher, Claviermacher.

Herr Ernst Weidinger, Fabriks-Director.

Commissions-Mitglieder für Böhmen.

Herr Franz Graf von Harrach, Fabriksinhaber und Präsident des böhm. Gewerb-Vereins,
Herr Carl Balling, Professor der Chemie & Vice-Präsident des böhm. Gewerb-Vereins,
Herr Johann B. Riedel, Kaufmann & Vorsteher des Handelstandes,
Herr Dr. Carl Kreutzberg, Fabriksinhaber,
Herr B. von Partheim, Fabriksinhaber.
Herr Franz Richter, Fabriksinhaber.
in Prag.

Herr Johann Liebig, Fabriksinhaber und Präsident des Gewerb-Vereines,
Herr Wilhelm Sigmund, Fabriksinhaber.
in Reichenberg.

Herr Carl Fischer, Fabriksinhaber in Pirkenhammer.

Herr Eduard Leitenberger, Fabriksinhaber in Reichstadt.

Herr A. D. Mayer, Fabriksinhaber in Winterberg.

Herr M. Mayer, Bergswerks-Director in Neu-Joachimsthal.

Herr Joh. Reinhold, Fabriksinhaber in Warnsdorf.

Commissions-Mitglieder für Mähren und Schlesien.

Herr Hugo Furst von Salm-Reifferscheid-Krautheim, Fabriksinhaber und Präsident der Mährisch-Schlesischen Landwirthschaftsgesellschaft.

Herr Leopold Haupt, Fabriksinhaber.

Herr Florentin Robert, Fabriksinhaber in Selowitz.

Herr Philipp Scholler, Fabriksinhaber in Brünn.

Herr Heinrich Zurhelle, Fabriks-Director in Namiest.

Commissions-Mitglieder für Galizien die Bukowina und das Gebiet von Krakau.

Herr Alfred Graf v. Potocky, k. k. geh. Rath und Fabriksinhaber.

Herr Joseph Ruszegger, k. k. Gubernialrath und Bergwerks-Director in Wieliczka.

Herr Carl Hausner, Groszhändler in Brody.

Herr Vincenz Kirchmayer, Groszhändler, in Krakau.

Herr Florian Seiger, Groszhändler, in Lemberg.

Commissions-Mitglieder für Ungarn, Croatien, Slavonien, Siebenbürgen die Woiwodina, das Temescher Banat und die Militärgränze.

Herr Graf Joh. Barkotzy, Grundbesitzer,
Herr August L. Krause, k.k. Cameralrath und Fabriken-Inspector,
Herr Christ. J. Malvieux, Groszhändler,
Herr Samuel v. Joob, Güter-Director,
in Pesth.

AUSTRIA—continued.

Herr Joseph Ritter v. Ferro, k. k. Sectionsrath und Ministerial-Commissär, in Nagy-Banya.
Herr Carl Walburg, Kaufmann, in Kronstadt.
Herr Carl Meynier, Fabriksinhaber, in Fiume.
Herr Anton Tschopp, Grosshändler, in Carlstadt.

Commissions-Mitglieder für Steiermark, Kärnthen, Krain, Triest, Görz, Istrien, und Dalmatien.

Herr Doctor Franz Hlubeck, Professor und Secretär der Steiermärkischen Landwirthschafts-Gesellschaft, in Gratz.

Herr Dr. Carl Peintinger, Bergwerks-Director.	in Vordernberg.
Herr Peter Tunner, Vorsteher der montanistischen Lehranstalt,	
Herr Thomas Ritter v. Moro, Fabriksinhaber.	in Klagenfurt.
Herr J. Schliessmann, Bergwerks-Inspector,	
Herr Heinrich Costa, Oberamts-Director,	in Laibach.
Herr William Moline, Fabriks-Director.	
Herr Kalman Ritter v. Minerbi, Grosshändler und Fabriksinhaber,	in Triest.
Herr Carl Kriegsauer, Grosshandlungs-Dirigent.	

Commissions-Mitglieder für das Lombardisch-Venetianische Königreich.

Herr [illegible], Fabriksinhaber,	in Mailand.
Herr Ernst v. Mylius, Grosshandlungs-Gesellschafter,	
Herr Albert Keller, Fabriksinhaber,	
Herr Joseph Ant. Reali, Fabriksinhaber,	in Venedig.
Herr Peter Bisaglia, Fabriksinhaber,	
Herr Ferdinand Zucchelli, Kaufmann,	

Commissions-Mitglieder für Tirol und Vorarlberg.

Herr Caspar Litti, Fabriks-Director,	in Innsbruck.
Herr Joseph Mayer, Kaufmann,	
Herr Melchior Jenny, Fabriksinhaber.	in Vorarlberg.
Herr Johan Kennedy, Fabriksinhaber,	
Herr Anton Rhomberg,	

Herr Jos. Bettini, Fabriksinhaber, in Roveredo.
Herr Johann Putzer, Grosshändler in Botzen.

Commissions-Mitglied für Ober-Oesterreich und Salzburg.

Herr Johann Ritter v. Dierzer, Fabriksinhaber in Linz und Vorsteher der Delegation des Nieder-Oesterreichischen Gewerb-Vereines.

Herr Dr. L. Kompass,	Delegirte des Nied Oesterr. Gewerb-Vereines in Steyer.
Herr Math. Lechner,	

Herr Carl Mitterbacher, Fabriksinhaber, in Salzburg.

PRUSSIA.—A Commission formed, consisting of the following Members:—

Geheimen Ober-Finanzrath von Viebahn.
Geheimen Regierungsrath Delbrück.
Director des Königlichen Gewerbe-Instituts, Dr. Druckenmüller.
Professor Dr. Schubarth.
Geheimen Kommerzienrath Wedding.
Geheimen Kommerzienrath Brix.
Geheimen Kommerzienrath Carl.
Geheimen Kommerzienrath Baudouin.
Herr F. Zimmermann.
Herr Weigert.
Herr Oertling.
Herr Dr. Ludersdorf.
Herr Bidter.

BAVARIA.—The Polytechnic Society of Munich.

SAXONY.—M. le Dr. Weinlig, Conseiller intimé au Ministère de l'Intérieur.

HANOVER.—Art-Union of Hanover.

WURTEMBURG.—Herr Sautter, President of the Central Society for Industry and Trade.

NASSAU.—The Chamber of Commerce of Nassau, through its President the Assessor Odernheimer of Wiesbaden.

GRAND DUCHY OF HESSE DARMSTADT.

Herr Commerzienrath [illegible], President of the Trades' Union of the Grand Duchy of Hesse.

HAMBURGH.—The Society for the Promotion of Arts and the Useful Professions.
Dr. W. A. Kramer (Secretary).

BREMEN.—Dr. Henry Gröning.

LUBECK.—The Trades Committee of the Patriotic Society.

SWITZERLAND.—A Commission formed, consisting of the following Members:—

[illegible]

M. Jenni, Manufacturer, of Glaris.
M. Sarasin, of Bale.
M. Sulzberger, Manufacturer, of St. Gall.
M. Ziegler Pellis, of Winterthur.

RUSSIA.

Two Commissions formed, one at St. Petersburg and the other at Odessa. The Royal Commissioners to communicate with them through the Agent of the Imperial Finance Department (M. KAMENSKY), who resides in London.

SWEDEN.—M. D. C. DE SKOGMAN, Président du Collège du Commerce.

NORWAY.

M. LANGBERG, Professor of Natural Philosophy.
Colonel GARBEN, of the Engineers.
M. YARBELL, Mechanician.
Captain VERGELAND, of the Artillery.
M. SCHINNER, Architect.
M. VERGMAN, Ornamental Painter.

Who together form the direction of the Society of Arts at Christiania.

DENMARK.—A Commission formed.

TUSCANY.—A Commission formed, consisting of the following Members:—

President.—The Chevalier BALDASSERONI, Minister of Finance and Commerce.
Sir G. B. HAMILTON, H.B.M. Minister Plenipotentiary at the Court of Tuscany. (Since dead.)
Signor CORRIDI, Director of the Technical Institute of Florence.
The Chevalier BROCCHI, Ex-Director of ditto.
The Marquis RIDOLPHI, Deputy of the Academy of the Georgofili.
Mr. HORACE HALL, Deputy of the Chamber of Commerce of Florence.
Count F. DE LARDENEL, Deputy of the Chamber of Commerce of Leghorn.
The Marquis MAZZAROSA, Deputy of the Chamber of Commerce of Lucca.

NAPLES.—A Commission formed, composed of Members of the Reale Istituto d'Incoraggiamento.

SARDINIA.—A Commission formed, including the Hon. RALPH ABERCROMBY, H.B.M.'s Minister Plenipotentiary at the Court of Sardinia.

SPAIN.—A Commission formed, consisting of the following Members:—

Commissioners.

EL ALMIRANTE DUQUE DE VERAGUA (*President*).
Don SALUSTIANO DE OLOZAGA.
Don ANTONIO RAMON ZARCO DEL VALLE.
Don JUAN ALVAREZ Y MENDIZABAL.
Don ALEJANDRO OLIVAN.
Don JOSE CAVEDA.
Don CHRISTOBAL BORDIN.
Don JOAQUIN ALFONSO.
Don ANTONIO GUILLERMO MORENO.
Don JUAN MANUEL CALDERON.
Don BUENAVENTURA CARLOS ARIBAN.
Don MANUEL GARCIA BAVRANALLANA.
Don CIPRIANO SEGUNDO MONTESINO.

Committee.

Don SALUSTIANO DE OLOZAGA (*President*).
Don JUAN ALVAREZ Y MENDIZABAL.
Don ANTONIO RAMON ZARCO DEL VALLE.
Don MANUEL GARCIA BAVRANALLANA.
Don CIPRIANO SEGUNDO MONTESINO (*Secretary*).

TURKEY.—A Commission formed, consisting of the following Members:—

President.

ISMAEL PACHA, Minister of Commerce.

Vice-Presidents.

SALIK BEY, Assistant of the Minister of Commerce.
SAID BEY, Secretary to the President.
M. LAFONTAINE, Secretary to correspond with England.

Members.

NEJEEB EFFENDI.
HAJJI BEKIR AGA.
YUSUF HAJJAR.
SEID MUSTAPHA EFFENDI.
HAJJI HASHIM ZADEH EMIN EFFENDI.
BALMOOMJI ZADEN SALIK EFFENDI.
GORGHI ALESIOGLON.
YACOOB VARTORES.
ELIA HAVA.

GREECE.—A Commission formed, consisting of the following Members:—

M. LUCAS RALLI, *President.*
M. SIMOS.
M. C. N. DOSSIOS.
M. le Capitaine G. TOMBAZIS.
M. L. CAFTANGIOGLU.
Professor LANDERER.
M. C. G. DOUROUTTI.
M. G. P. SCUZÉS.
M. DOMNANDO.
M. S. A. SPILIOTAKIS, *Secretary.*

PERSIA.—The MELLIK-OOT-TOOJJAR, Chief of the Merchants.

CHILE.—The following Gentlemen have been appointed to correspond with the Commission in London:—

Don PEDRO NOLASCO MENA, Chairman of the Society of Agriculture and Beneficence.
Don IGNACIO DOMEYKO, Professor of Chemistry.
Don JULIO JARRIEZ, Director of the School of Arts and Trades.

PERU.

The Minister of the Home Department (*President*).
Don Luis Fonceca.
Don Nicolas Pierola.
Don Nicolas Rodrigo.

VENEZUELA.

A Commission formed. The Royal Commissioners to communicate through Mr. Milligan, Consul-General for the Government of Venezuela.

UNITED STATES.

The National Institute, in conformity with the wish of the Government, have appointed the following Gentlemen to form a Central Committee to correspond with the different Societies and Local Committees throughout the United States.

Hon. Millard Fillmore, President of the United States, Chancellor of the Regents of the Smithsonian Institution.

Colonel Peter Force, President of the National Institute.

Hon. Jas. A. Pearce, United States' Senate, Member of the Board of Regents of the Smithsonian Institution.

Hon. Levi Woodbury, Member of the National Institute, Associate Justice of the Supreme Court of the United States.

Commodore Lewis Warrington, United States' Navy, Member of the National Institute, Chief of the Bureau of Ordnance and Hydrography.

Professor Joseph Henry, Vice-President of the National Institute and Secretary of the Smithsonian Institution.

Professor Walter R. Johnson, Corresponding Secretary of the National Institute.

Professor Alexander D. Bache, Member of the National Institute, Member of the Board of Regents of the Smithsonian Institution, and Superintendent of the Coast Survey.

Commander Charles Wilkes, United States' Navy, Member of the National Institute, late Commander United States' Exploring Expedition.

Hon. W. W. Seaton, Member of the National Institute, Mayor of Washington.

Hon. Jefferson Davis, United States' Senate, Member of the Board of Regents of the Smithsonian Institution.

Lieutenant Matthew F. Maury, United States' Navy, Vice-President of the National Institute, and Superintendent of the National Observatory.

Charles F. Stansbury, Esq., Recording Secretary of the National Institute.

J. James Greenough, Esq., Member of the National Institute.

Colonel J. J. Abert, Member of the National Institute, Chief of the Topographical Bureau.

General Jos. G. Totten, Vice-President of the National Institute, Chief Engineer United States' Army.

Thomas Ewbank, Esq., Commissioner of Patents.

William Easby, Esq., Treasurer of the National Institute.

Dr. Leonard D. Gale, Member of the National Institute, Examiner of Patents.

J. C. G. Kennedy, Esq., Member of the National Institute, Superintendent of Census.

Ezra C. Seaman, Esq., Member of the National Institute.

Professor Walter R. Johnson (*Secretary*).

FOREIGN COMMISSIONERS.

Austria . . .	C. Buschek. Dr. Schwartz.
Bavaria . . .	Professor Dr. Schafhault.
Belgium . . .	M. de Brouckère. M. Cuylits.
Denmark . . .	Regnar Westenholz.
France . . .	Sallendrouze de Lamornaix.
Grand Duchy of Hesse . . .	M. Rössler.
Greece . . .	M. Ralli.
Hamburgh . .	M. Piglheim.
Hanse Towns .	M. Uobock. M. Piglheim.
Holland . . .	J. P. Dudok van Heel.
Portugal. . .	F. J. Vanzeller. Antonio Valdez.
Prussia . . .	M. Hebeler.
Rome	Sr. Carlo Trebbi.
Russia . . .	Gabriel Kamensky.
Sardinia . . .	Chevalier Lencisa.
Saxony . . .	Dr. W. Seyffarth, LL.D. Gustavus Doërstling.
Spain	Don M. de Ysasi. Don Ramon de la Sagra. Don Ramon Echevarria. Don J. Villanueva. Don C. Murrieta.
Sweden & Norway.	Charles Tottie.
Switzerland. .	Dr. Bolley. Mr. Eichholzer.
Tunis	Sig. Hamda Elmkadden.
Turkey . . .	Edward Zorab.
Tuscany . . .	Professor P. Corridi.
United States .	Edward Riddle. C. F. Stansbury. N. S. Dodge, Secretary and Acting Agent.
Wurtemburg. .	C. Brand.
Zollverein . .	Chevalier Hebeler. Baurath Stein.

JURORS FOR THE UNITED KINGDOM.

CLASS I.

Sir H. De La Beche, C.B., F.R.S.
M. Faraday, F.R.S.
W. Logan, F.G.S.
Richard Taylor, F.G.S.

CLASS II.

Jacob Bell, M.P.
Thomas Graham, F.R.S.
John Mercer, F.C.S.
H. L. Pattinson, F.C.S.

CLASS III.

Sir J. P. Boileau, Bart., F.R.S.
Joseph D. Hooker, M.D., R.N., F.R.S.
Dr. Lindley, F.R.S.

CLASS IV.

Professor Richard Owen, F.R.S.
Dr. Royle, F.R.S.
Professor Solly, F.R.S.
N. Wallich, M.D., F.R.S.

CLASS V

W. Fairbairn.
John Farey.
John Hick.
H. Maudslay.
Rev. E. Moseley, M.A., F.R.S.
Robert Napier.

CLASS V*a*.

J. Holland.
T. Hutton.
Earl Jersey.

CLASS VI.

Benjamin Fothergill.
Charles Gascoigne Maclean.
John Penn.
George Rennie, F.R.S.
T. R. Sewell.
Professor R. Willis, F.R.S.

CLASS VII.

Dr. Neil Arnott, F.R.S.
I. K. Brunel, F.R.S.
J. M. Rendel, F.R.S.
William Tite, F.R.S.

CLASS VIII.

Major-Gen. Sir J. Burgoyne, K.C.B.
A. F. Creuze, F.R.S.
Major-General Sir W. Morrison, K.C.B., M.P., F.R.S.
Sir Baldwin Walker, K.C.B.

CLASS IX.

Col. Challoner.
B. T. Brandreth Gibbs.
A. Hammond.
Josh. Locke, M.P., F.R.S.
W. Miles, M.P.
P. Pusey, M.P., F.R.S.
J. V. Shelley.
H. S. Thompson.

CLASS X.

Sir David Brewster, F.R.S.
J. Glaisher, F.R.S.
Sir John Herschel, Bart, F.R.S.
W. H. Miller, F.R.S.
Richard Potter, A.M.

CLASS X.—*continued.*

Sub-Jury A.

W. Sterndale Bennet.
Sir H. R. Bishop.
Sir G. Smart.
Dr. Wylde.

Sub-Jury B.

J. H. Green, F.R.S.
W. Lawrence, F.R.S.
James Philp.

CLASS XI.

Sir James Anderson, Lord Provost of Glasgow.
Thomas Ashton.
W. Gray, Mayor of Bolton.
George Jackson.
J. Aspinal Turner.

CLASS XII.

Samuel Addington.
Henry Brett.
John Cooper, J.P.
Henry Forbes.
George Lawton.
Thomas Marling.

CLASS XIII.

Samuel Courtauld.
Thomas Jeffcoat.
George Tawke Kemp.
Charles Warwick.
Thomas Winkworth.

CLASS XIV.

William Charley.
John McMaster.
John Moir.
Charles Tee.
John Wilkinson, J.P.

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W. Clabburn.
John R. Lavanchy.
John Morgan.
William Prinsep.
Titus Salt.
Frederick Schwann.

CLASS XVI.

Hon. Col. George Anson.
J. B. Bevington.
John Foster.
J. W. Newman.
J. A. Nicholay.

CLASS XVII.

Thomas De la Rue.
Viscount Mahon, F.R.S.
C. Venables.
C. Whittingham.

CLASS XVIII.

John Hargreaves.
Alexander Harvey.
Edmund Potter.
C. Swaisland.
Henry Tucker.

CLASS XIX.

D. Biddle.
Richard Birkin.
Peter Graham.
Thomas Simcox Lea, J.P.
Robert Lindsay.

CLASS XX.

T. Brown.
T. Christy.
William Felkin, Mayor of Notts.
E. Smith.

CLASS XXI.

Joseph B. Durham.
Mr. Alderman Peace.
Lord Wharncliffe.

CLASS XXII.

Arthur Adams.
W. Bird
W. Dyce, R.A.
Sterling Howard.
G. Shaw.
Henry Van Wart.

CLASS XXIII.

James Garrard.
John Gray.
Henry Hope, M.P.
Westley Richards.

CLASS XXIV.

E. H. Baldock, M.P.
R. L. Chance.
Lord De Mauley, F.R.S.
Robert Orrard.

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Duke of Argyll.
W. Mortlock.
Chas. Baring Wall, Esq., M.P., F.R.S
John A. Wise.

CLASS XXVI.

Lord Ashburton.
John Lewis Aubert.
J. G. Crace.
John Jackson.
Edward Snell.
John Webb.

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George Godwin, F.R.S.
Sir Chas. Lemon, Bart., F.R.S., M.P.
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Dr. E. Lankester, F.R.S.
F. J. Miller.
T. A. Wise, M.D., Hon. E.I.C.S.

CLASS XXIX.

Lord Canning.
Arthur Henfrey.
Warren De la Rue, F.R.S., F.C.S.
J. J. Mechi.

CLASS XXX.

C. R. Cockerell, R.A.
Lord Colborne.
J. Gibson.
W. Newton.
A. W. Pugin.
Richard Redgrave, R.A.
W. Wyon, R.A.

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9. *Agricultural and Horticultural Machines and Implements*—Mr. BRANDRETH GIBBS and Ensign SOADY, R.E.

10. *Philosophical, Musical, Horological, and Surgical Instruments*—Lieut.-Colonel LLOYD and Lieutenant TREVOR.

11. *Cotton*—Mr. GEORGE WALLIS and Mr. W. HAWKINS.

12. *Woollen and Worsted*—Mr. G. WALLIS and Mr. W. HAWKINS.

13. *Silk and Velvet.* 14. *Flax and Hemp*—Mr. WALLIS.

15. *Mixed Fabrics, including Shawls*—Mr. WALLIS and Mr. HAWKINS.

16. *Leather, Saddlery and Harness, Skins, Fur, and Hair*—Mr. DODD.

17. *Paper, Printing, and Bookbinding*—Mr. OWEN JONES.

18. *Woven, Felted, and Laid Fabrics, Dyed and Printed*—Mr. WALLIS.

19. *Tapestry, Carpets, Floorcloths, Lace and Embroidery, &c.*—Mr. LOWE.

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22. *General Hardware, including Locks and Grates*—Mr. R. A. THOMPSON.

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24. *Glass.* 25. *China, Porcelain, Earthenware, &c.*—Lieutenant PASLEY, R.E.

26. *Furniture, Upholstery, Paper Hangings, Papier Mâché, and Japanned Goods*—Mr. C. T. THOMPSON.

27. *Manufactures in Mineral Substances, for Building or Decorations*—Professor ANSTED.

28. *Manufactures from Animal and Vegetable Substances, not being woven or felted*—Mr. C. T. THOMPSON.

29. *Miscellaneous Manufactures and Small Wares*—Mr. DODD.

30. *Sculpture, Models, and Plastic Art, Mosaics, Enamels, &c.*—Mr. OWEN JONES.

A List of the LOCAL COMMITTEES *of the* UNITED KINGDOM *which returned Exhibitors, and Subscriptions to the General Fund up to the period of the opening of the Exhibition.*

Places.	Approximate Number of Exhibitors.	Reported Amount from Local Committees.			Amount paid to Commission.		
		£.	s.	d.	£.	s.	d.
METROPOLIS.							
City of London .	2697	26189	18	9	24110	3	6
Do. Ladies .		673	18	0			
Westminster .		6840	5	5	5381	12	0
Do. Ladies .		841	2	6			
Society of Arts .		1082	7	10	1082	7	10
Brentford . .		54	16	8	54	16	8
Chelsea . . .		141	11	0	100	0	0
Chiswick . .		78	3	7	78	3	7
Finsbury . .		205	4	0	205	4	0
Greenwich . .		240	14	4	180	0	0
Hammersmith .		38	1	4	38	1	4
Hampstead . .		25	0	0	25	0	0
Kensington . .		296	10	6	296	10	6
Marylebone . .		1206	16	1	500	0	0
Poplar . . .		60	0	0	60	0	0
South London .		619	2	6	619	2	6
Southwark . .		210	0	0	210	0	0
Tower Hamlets .							
Woolwich . .		223	7	4	200	0	0
Aberdeen . . .	43	190	0	0	190	0	0
Aberystwyth . .							
Abingdon . . .	3						
Alexandria (N. B.) .							
Alloa	7	41	16	0	41	16	0
Alton							
Amlwch (Anglesea).							
Appleby							
Arbroath . . .	5	21	13	0	15	0	0
Ashborne . . .		5	13	0	1	11	0
Ashburton . . .	4	9	3	0	7	0	0
Ashford	2						
Ashton-under-Lyne .	3						
Aylesbury . . .	2						
Bakewell . . .	7						
Banbury . . .	12	20	0	0	20	0	0
Barnard Castle . .	2	11	11	0	11	11	0
Barnsley . . .	16	132	0	0	132	0	0
Barnstaple . . .	3	40	11	0	30	15	0
Barton on Humber .							
Basingstoke . . .	2	128	14	0	128	14	0
Bath	43	200	0	0	200	0	0
Batley (Yorkshire) .	10	133	11	6	133	11	6
Bedford	10	115	13	2	115	13	2
Belfast	33	336	12	6	300	0	0
Belper		60	0	0	60	0	0
Berwick, North . .							
Berwick-upon-Tweed	2						
Beverley . . .	4	93	3	6	93	3	6
Bideford . . .	9	10	0	0	10	0	0
Biggleswade . .							
Billericay . . .		9	13	0			
Bilston							
Bingley (Yorkshire)	3	132	10	0	132	10	0
Birmingham . .	350	783	3	6	300	0	0
Bishops Stortford .	1						
Blackburn . . .	3	773	0	0	630	0	0
Bodmin		55	15	0	52	15	0
Bolton (Lancashire).	13	889	17	1	630	0	0
Boston	4	40	0	0			
Bradford (Yorkshire)	37	1384	11	1	1100	0	0
Bradford (Wilts) .	4	31	3	6	31	3	6
Braintree . . .		3	7	3	3	7	3
Brampton . . .		13	3	3	13	3	3

Places.	Approximate Number of Exhibitors.	Reported Amount from Local Committees.			Amount paid to Commission.		
		£.	s.	d.	£.	s.	d.
Brecon		70	4	0	70	4	0
Brentwood . . .	1	6	11	0	6	11	0
Bridgenorth . . .		21	1	0	21	1	0
Bridgwater . . .	5	37	6	0	21	0	0
Bridlington . . .							
Bridport . . .	2	69	19	0	50	0	0
Brighton . . .	25	183	0	0	150	0	0
Bristol	52	756	1	6	650	0	0
Bromsgrove . . .	2						
Buckingham. . .	3	20	0	0	20	0	0
Burnley	1						
Burton-on-Trent .	1	161	11	0	113	3	0
Bury St. Edmunds .	8	26	19	0	20	0	0
Bury (Lancashire) .	2	70	0	0	50	0	0
Buxton	2	7	0	0	6	15	11
Camborne . . .	1	37	5	6	37	5	6
Cambridge University		140	0	0	132	2	0
Cambridge Town .	8	183	8	6	150	0	0
Canterbury . . .	3	23	19	0			
Cardiff	8	96	0	0	96	0	0
Carlisle	10	257	11	6	200	0	0
Carnarvon . . .	12						
Chard							
Chatham . . .		75	3	8	62	14	10
Cheadle	3						
Cheltenham . . .	9	164	14	6	100	0	0
Chelmsford . . .	8	78	18	0	60	0	0
Cheshunt . . .	3	8	0	0	8	0	0
Chester	10	62	10	0	62	10	0
Chesterfield . . .	8						
Chichester . . .	6	99	15	0	90	0	0
Chippenham . . .	3	33	2	0	20	0	0
Chipping Norton .							
Chorley							
Cirencester . . .							
Cockermouth . .	3						
Coggeshall . . .	3	21	13	0	21	0	0
Colchester . . .	15	79	2	2	60	0	0
Colne	2	20	0	0	20	0	0
Congleton . . .		29	18	0	24	18	0
Cork	22	50	0	0	50	0	0
Coventry . . .	24	112	0	0	112	0	0
Crayford (Kent) . .		13	2	0	13	2	0
Crewkerne . . .	17	13	19	6	10	0	0
Cricklade . . .	1						
Cupar		24	5	6	18	10	0
Cowes	2						
Dalkeith . . .	1	6	3	6	6	3	6
Darlington . . .	9	50	0	0	70	0	0
Dartmouth . . .							
Deal	2	5	17	0	5	17	0
Derby	37	388	7	2	300	0	0
Devizes	6	14	0	0	11	4	6
Devonport . . .	3	63	0	0	40	0	0
Dewsbury . . .							
Doncaster . . .	3	123	13	0	123	13	0
Dorchester . . .	3	14	14	0	14	14	0
Dorking		83	13	6	83	18	6
Dover	6	127	1	0	70	0	0
Driffield, Great . .	1	35	0	0	35	0	0
Dublin	137						
Dudley	6	258	8	0	241	0	0
Dumbarton . . .		60	0	0	60	0	0
Dumfries, County of .	13						

Places.	Approximate Number of Exhibitors.	Reported Amount from Local Committees.			Amount paid to Commission.		
		£.	s.	d.	£.	s.	d.
Dumfries, Burgh		140	0	0	140	0	0
Dunbar	1	12	0	6	10	10	0
Dundee	3	100	0	0	100	0	0
Dunfermline	8	154	14	6	133	1	0
Dunmow	1	15	8	6	10	0	0
Dunstable	2	10	0	0	10	0	0
Durham	3	163	11	10	150	0	0
Edinburgh	137	688	12	5	300	0	0
Egham		83	17	0	83	17	0
Elgin	6	20	0	0	20	0	0
Exeter	29	90	0	0	90	0	0
Exmouth	1	17	15	0	17	15	0
Falkirk	6						
Falmouth and Penryn	23	34	9	0	30	0	0
Faringdon	1	5	5	6	2	16	9
Farnham	5	21	0	0	21	0	0
Fleetwood		3	8	10	3	8	10
Folkestone	1	38	6	0	38	6	0
Forfar							
Frome	2	31	14	0	31	14	0
Gainsborough							
Galashiels	12	60	0	0	60	0	0
Glasgow	126	2665	12	0	2400	0	0
Glastonbury	8	22	10	6	20	0	0
Glossop	1	35	3	0	25	0	0
Gloucester	10	104	1	6	90	0	0
Godalming	4	23	1	6	23	1	6
Gosport	1	41	13	4	41	13	4
Grantham	4	62	12	0	59	8	0
Gravesend	5						
Great Grimsby		77	8	0	77	8	0
Greenock	9	130	0	0	100	0	0
Guildford	1	87	15	0	87	0	0
Guernsey	14	271	19	6	271	19	6
Haddington		15	10	0	14	17	0
Halifax	31	718	6	6	608	10	3
Halstead							
Hartlepool	1	39	4	0	35	0	0
Harwich	20						
Hastings	20	100	4	0	80	0	0
Hawick	6	27	2	0	19	19	5
Hayle							
Helston	2	19	10	0	19	10	0
Hemel Hempstead	1						
Henley		21	0	0	21	0	0
Hereford	11	85	7	0	61	5	6
Hertford	8	30	0	0	30	0	0
Hitchin		21	10	2	19	5	8
Hong Kong		131	5	5	131	5	5
Honiton	1						
Horncastle		12	11	6	12	11	6
Huddersfield	70	882	8	6	850	0	0
Hull	27	280	4	6	227	12	6
Huntingdon	1	50	2	6	50	2	6
Ilfracombe		9	11	6	7	4	8
Ipswich	22	340	3	0	200	0	0
Isle of Man (Douglas)	13						
Isle of Wight	2	52	11	0	50	0	0
Newport		85	0	0	85	0	0
Ryde	1	25	0	0	25	0	0
Cowes	2	50	0	0	50	0	0
Ventnor		7	7	6	5	8	9
Jedburgh	1	12	10	6	12	10	6
Jersey	19	250	0	0	250	0	0
Keighley (Yorkshire)	2	100	14	0	100	0	0
Kelso							
Kendall	7	117	12	0	105	0	0
Keswick	2	20	16	0	20	16	0
Kidderminster	17	200	0	0	200	0	0
Kilmarnock	7						
Kingsbridge		5	0	0			
King's Lynn		56	0	0	56	0	0
Kirkcaldy	5	68	0	0	68	0	0
Knaresborough	12	19	4	6	19	4	6
Lanark							
Lancaster	5	88	7	0	76	12	10
Launceston	1						
Leamington	2	43	2	6	32	0	10
Leek	10	23	0	6	21	5	0
Leeds	134	2030	8	2	1600	0	0
Leicester	38	199	6	6	150	0	0
Lewes	6	103	7	6	100	0	0
Lichfield	4	26	11	0	20	0	0
Limerick	12						
Lincoln	3	56	12	0	56	12	0
Liskeard	3	10	0	0	10	0	0
Liverpool	63	827	13	0	500	0	0
Llanelly	9	141	4	2	100	0	0
Louth (Lincoln)	2	29	7	6	28	5	3
Luton	1						
Macclesfield	6	150	0	0	150	0	0
Maidenhead	1	54	13	6	49	12	8
Maidstone	21	74	4	6	74	4	6
Malmsbury		13	0	7	13	0	7
Manchester	191	4547	10	0	4000	0	0
Margate	2	62	3	1	62	3	1
Market Weighton		3	0	0	3	0	0
Marlborough	7	15	4	6	15	4	6
Marlow (Great)	7	7	0	0	7	0	0
Matlock	1						
Melksham	2	20	17	0	20	11	0
Melrose		10	3	2	10	3	2
Merthyr Tydvil		205	14	4	205	14	4
Middlesboro'		45	0	0	45	0	0
Montrose	2	62	7	0	56	18	0
Newark	7	59	4	0	52	0	0
Newbury	9	58	8	6	50	0	0
Newcastle (Stafford.)	8	32	14	6	32	14	0
Newcastle-on-Tyne	76	522	4	0	446	16	0
Newnham (Glo'ster)	1	96	14	3	79	19	3
Newport(Monmouth.)	10	75	18	6	60	0	0
Newport Pagnell	1	7	1	0	5	6	0
Newton (Devonshire)							
North Allerton	2	22	0	0	22	0	0
Northampton	16	56	10	0	55	0	0
Norwich	35	400	0	0	400	0	0
Nottingham	60	200	0	0	200	0	0
Odiham (Hants)		18	10	6	18	10	6
Okehampton							
Oldham		89	13	0	75	0	0
Oswestry	5	23	19	0	22	10	0
Oxford	27	200	0	0	150	0	0
Paisley	31	146	13	0	126	8	0
Pateley Bridge		13	8	0	12	0	0
Penzance	4						
Peterborough	1	43	3	0	17	13	8
Perth	19	40	0	0	40	0	0
Plymouth	8	110	12	0	110	12	0
Pocklington		4	11	6	4	11	6

Places.	Approximate Number of Exhibitors.	Reported Amount from Local Committees.			Amount paid to Commission.		
		£	s.	d.	£.	s.	d.
Poole	7	30	0	0	30	0	0
Pontefract							
Port Glasgow							
Portland		10	0	0	10	0	0
Portsmouth	9	300	0	0	300	0	0
Preston	4	264	10	0	220	0	0
Ramsgate	4	36	7	6	30	0	0
Reading	17	78	18	0	70	0	0
Redruth	12						
Reigate	9	30	0	0	30	0	0
Retford (East)	3						
Richmond (Yorkshire)	3	84	6	6	84	6	6
Ripon	4	25	0	0	15	0	0
Rochester		8	12	0	1	0	8
Romsey (Hants)	1	16	13	10	16	13	10
Rotherham	8	69	0	0	40	0	0
Rugby	6	13	0	6	10	10	0
Runcorn	1	23	12	0	22	14	6
Rye	1						
Saffron Walden	5	23	17	6	20	0	0
Salisbury	2	80	7	0	70	19	0
Scarborough	5	29	0	0	29	0	0
Selby	3	18	16	0	18	16	0
Selkirk	2	24	0	0	24	0	0
Settle	4	4	0	0	4	0	0
Sheerness	4	24	10	0	21	10	0
Sheffield	158	844	19	0	500	0	0
Shrewsbury	13	297	3	0	282	0	0
Sidmouth		9	9	0	7	2	0
Skipton							
Slough		38	15	0	38	15	0
Southampton	13	350	0	0	250	0	0
Southport		5	18	0	5	18	0
South Molton		13	18	6	13	18	6
South Shields	8	20	0	0	20	0	0
Spalding	6						
Stafford	3	30	0	0	30	0	0
Staffordshire Potteries	46	250	0	0	249	15	6
Stamford	7	10	15	0	10	15	0
St. Andrews							
St. Albans	7	50	0	0	50	0	0
St. Austell	17	15	0	9	15	0	9
St. Columb							
St. Helen's							
St. Neots	1	11	10	6	11	10	6
Stirling	10	99	17	6	80	0	0
Stockport	4	350	0	0	350	0	0
Stockton	11	70	0	0	70	0	0
Stonehaven							
Stonehouse (Plymouth)	1	18	11	0	15	0	0
Stourbridge	17	77	6	0	50	0	0
Stroud	13	92	16	6	92	16	0
Sudbury							
Sunderland		192	12	0	150	0	0
Swansea	19	150	8	0	50	0	0
Swindon		8	0	0	8	0	0
Tamworth	2	49	7	6	40	0	0
Taunton	13	88	0	0	50	0	0
Tavistock	3						
Tewkesbury		20	18	0	20	18	0
Thorne							
Tiverton							
Torpoint							
Torrington							
Totness	3	23	16	0	17	12	10
Tring		3	17	4	2	15	0
Truro	25	92	13	0			
Tunbridge Wells	3						
Trowbridge		41	3	6	41	3	6
Uttoxeter		30	0	0	30	0	0
Wakefield	12	250	0	0	250	0	0
Walsall	10	39	10	6	39	10	6
Waltham Abbey	3	25	17	6	24	0	0
Wallingford							
Wareham	10	22	0	0	22	0	0
Warrington	7	196	15	6	150	0	0
Warwick	7	60	0	0	60	0	0
Waterford	3						
Wellington (Salop)	1	70	0	0	70	0	0
Wellington (Somerset)	2						
Wells	1	42	12	6	37	13	2
Wentworth		5	0	0	5	0	0
Wexford	12	3	17	6			
Whitby	17	49	4	0	40	0	0
Whitehaven	6	120	1	6	100	0	0
Wigan	4	243	6	7	160	0	0
Winchester	2	90	0	0	90	0	0
Windsor	6	385	14	0	300	0	0
Wirksworth	2	15	0	0	15	0	0
Wisbeach	10	62	13	6	62	13	6
Witham	3						
Wolverhampton	35	270	17	0	200	0	0
Wolverton	1	6	0	0	6	0	0
Woodstock							
Wootton Bassett							
Wotton Under Edge	2	28	12	6	26	10	0
Worcester	20	206	15	0	185	0	0
Workington	5	6	11	5	6	11	5
Worthing		33	0	6	25	0	0
Yarmouth, Great	10	30	7	0	30	7	0
Yeovil	10	74	3	6	66	3	3
York	15	100	0	0	100	0	0
Zetland and Shetland							
Sundry Subscriptions not included elsewhere	..	357	18	2	357	18	2
Total	6146	76,679	17	1	64,541	16	3

THE

CONSTRUCTION OF THE BUILDING.

The present industrial position of England indicated by the building, as well as the leading characteristics of her citizens, both personal

HAD circumstances determined that the present industrial position of England should have been represented by the building alone, while other nations should have been allowed to indicate the scope of their resources by a display of choice specimens of all the varied branches of productions to which their efforts had of late years been directed, it is singular to remark how few elements, essential to her commercial success, would have been lost sight of. The courage of her citizens would have been manifested in the vastness of the scheme, their energy, determination, and strength, in the surprising rapidity with which every operation had been carried on.

and social.

The happy condition of the liberty of the subject would have been attested by the circumstance of its having been in the power of the people alone to will the existence of so vast a structure; while the fact that the whole expenses had been provided for without in any way trenching on the national resources, would have evidenced at once the wealth and the spirit of enterprise common to every class of society.

Evidence given by the building of extent of national resources in the production of Raw Material, Machinery, Manufactures, and objects of Fine Arts.

That it should have been possible in any country to have so speedily collected such a vast quantity of materials, without previously sounding the note of preparation, would have furnished strong evidence of the abundance of its native resources, and conveyed some faint idea of the extent of the stores of raw material kept ever ready to supply the exigencies of sudden demand. That that raw material should have been moulded into forms so various, so complex, and so original, in so short a time, would argue that such a result could alone have been effected by the natives of a country in which a knowledge of the principles and practice of mechanics and machinery had been long deeply studied and widely diffused. The facility with which the machinery employed must have been brought to bear upon the masses of raw material supplied, would have evidenced a power to produce, and to elaborate matter into manufacture, of the very highest order; while the grace with which the charm of decoration has been superadded, to so utilitarian a structure, would have served to show, that mindful as the English habitually are, of the practical and economical, they are by no means indifferent to the beautiful in the Fine Arts.

Organization of labour, and co-operation in supply, developed by

Whoever had been enabled to trace through every stage the progress of the Exhibition Building, from the first order given by the contractor, to the issue of the final directions for its opening, would have had an opportunity of realising the perfection to which the practice of connecting commercial co-operation in supply,

great engineering works.

and mutual reliance in money and time bargains, with the methodical organization of labour, has been carried in England at the present time. It is by means of the experience acquired in the conduct of the vast engineering works which have of late years occupied the attention, and commanded the labours of some of her most intelligent citizens, that this country has been enabled to reduce to a perfect system this power of subordinating the supply of materials, and of eliciting, in similar works, that precise description of labour from every individual, for which his natural characteristics or education may have specially qualified him.

Combination and division of labour necessary to carry out such works.

The firm through whose exertions the building has been erected, in itself presents an excellent model of the commercial constitution necessary to produce such great works with rapidity. While of its heads, one is remarkable for high scientific attainments, another possesses singular commercial aptitude, together with a minute knowledge of the working details of his business. Others again, bring to the common stock of intelligence a precise knowledge of legal and monetary transactions, together with experience acquired in many years' connection with speculations of great magnitude. The principal superintendents and foremen set in operation by this intellectual motive power, are each adapted to the particular duties they may be called upon to perform, and act precisely as the various portions of a well-devised machine, being at the same time maintained in as perfect control. Through these agents the labour of the artisan, skilled in his own department, profoundly ignorant in others, is brought into useful operation; and thus thousands are combined to realise the will of one directing mind. But for the perfect system of discipline, which frequent practice in directing the labours of masses of workmen has now made general throughout England, it would have been impossible to have fashioned, in so short a time, so novel and so vast a structure as this Temple of Peace, the gates of which may, we trust, be thrown open to the world at large, for many years to come.

Division of the subject into—
I. The building as it stands.
II. Its creation.

How far the Exhibition Building conveys a true idea of English constructive power, can only be ascertained by a minute examination of its anatomy; and we shall therefore proceed to sketch in some detail its actual nature and appearance, and the successive steps by which it has grown into its present condition.

The site in Hyde Park.

The site for the building is the one originally proposed for it by H.R.H. PRINCE ALBERT at the first private meeting, held on the subject of the Exhibition, at Buckingham Palace, on the 30th June, 1849. It consists of a rectangular strip of ground in Hyde Park, situated between the Queen's Drive and Rotten Row, and contains about 26 acres; being approximately 2,300 feet in length, by 500 feet in breadth. Its principal frontage extends from east to west. Several lofty elms stretch across the centre of its length, and a few smaller trees are scattered over its area. These trees have for the most part been retained, and to the finest of them we are indebted for the existence of the beautiful transept roof; since, had they not presented difficulties to the construction of a roof of lower pitch, it is more than probable that the noble vault which now spans them would have been scarcely ventured on. The ground, although apparently level, actually falls, not less than 1 in 250 from west to east. From the popularity of the spot, the ease with which it can be approached, the opportunities for obtaining beautiful views of the building from every direction, and the facility with which it has been drained, and supplied with gas and water, it is scarcely possible that a site could have been found more admirably adapted for such a purpose, than the one upon which the building now stands.

The principal entrance to the Exhibition is situated in the centre of the south side, opposite to the Prince of Wales's Gate, one of the main entrances to Hyde Park. From this gate a good view of the southern façade of the transept (shown in fig. No. 1) is obtained. Passing through a vestibule, 72 feet by 48, the visitor finds admittance to the main building, and stands beneath the roof of the great feature of the whole, the transept. Above his head, at a height of 68 feet from the ground, springs a semi-cylindrical vault, 72 feet in diameter, which extends for a length of 408 feet from south to north. On each side of the space so covered, runs an aisle 24 feet wide. The "coup d'œil" afforded by the transept is represented in Plate I.

The Building:— **Its principal entrance;**

The "coup d'œil" on entering;

Fig. 1.

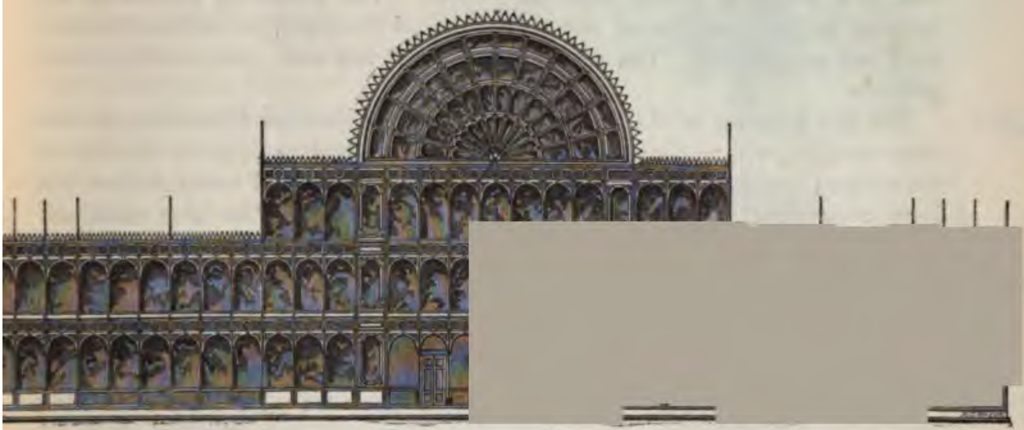
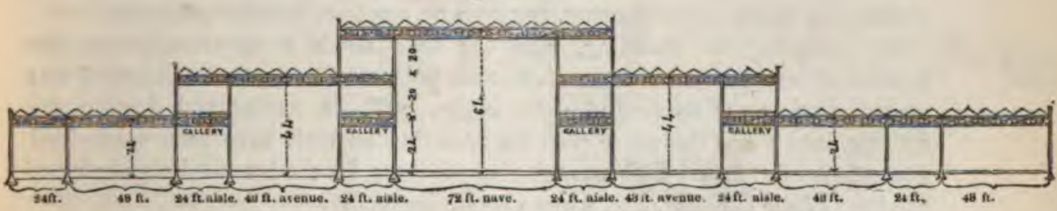


Fig. 2.



Advancing about halfway along the transept, the visitor will find himself as nearly as possible in the centre of the building; and from this point his eye may range eastward and westward along its vast nave, for a distance of upwards of 900 feet in each direction; the total length of the building being not less than 1848 feet. By reference to the ground plan given at page 1, and to fig. 2, a clearer idea may be formed of the manner in which the vast area, that thus opens itself to the view, has been distributed, than could be conveyed by many pages of description. The nave is a grand avenue 64 feet high and 72 feet wide, crossing the transept at right angles. On each side of it extend aisles 24 feet in width, and above them, at a height of 24 feet from the ground, are carried galleries, surrounding the whole of the nave and the transept; so that a complete circuit of communication is carried throughout the whole structure at that level.

Its central point;

Its extent,

Beyond these first aisles, and parallel with them, at a distance of 48 feet, are second aisles of similar width, and similarly covered for their whole width with galleries on the same level as those over the first aisles. In order that the

and divisions on plan.

public may pass freely from one line of galleries to the other, bridges, at frequent intervals, span the 48 feet avenues, and at the same time divide them into courts, each of which has been so arranged as to present an "ensemble" to the eye of the spectator looking down upon it from the galleries. The width of 48 feet which we have described as thus subdivided, and the second aisles, are roofed over at a height of 44 feet from the ground. The remaining portion of the building in width consists of one story only, 24 feet high; in which, of course, there are no galleries. Ten double staircases, 8 feet wide, give access to these galleries.

Its lightness of proportion,

The airy lightness of the whole structure, and its immense dimensions, are the features which will no doubt first excite the wonder, and perhaps the timidity of the visitor; but when he learns how rigidly the strength of every portion has been investigated, with what care the connection of every part has been made, and that the whole of that which appears to him so complicated, is but the repetition of a few simple elements, he will throw aside alarm, and rest upon the consciousness that those most competent to investigate questions of force to overturn, and strength to resist, have spared no pains to assure themselves of the perfection of the parts, and the consequent stability of the whole.

no evidence of instability.

General nature of materials,

The lightness of the proportions will at once assure the spectator of the nature of the material which forms the main supports of the building. While the vertical supports consist entirely of cast-iron, the horizontal connections and girders are constructed of both wrought and cast iron. Of wrought-iron it has been estimated that no less than 550 tons have been used, and of cast-iron 3,500 tons. The whole of the roof, above the highest tier of iron frame-work, consists of wood and glass, and the external enclosures and face-work are constructed almost entirely of the same materials. It is estimated that 896,000 superficial feet of glass, weighing 400 tons, have been employed; whilst the quantity of wood used, including the whole of the flooring, has been no less than 600,000 cubic feet.

Quantities of wrought iron;

Cast iron;

Glass;

Wood.

The plan divided into squares of 24 feet.

In designing the building, care has been taken so to arrange that the position of every column shall occur at the points of intersection of lines, 24 feet apart, crossing one another at right angles, while in roofing and flooring the squares, into which the whole plan has been thus allotted, have been subdivided into others of 8 feet. This arrangement accounts for the beautiful regularity of the lines of the columns, &c., when viewed diagonally.

Necessity of realizing the detail of one 24-feet bay, in order thereby to judge of the whole area.

In order to afford some idea of the extent of mechanical difficulties involved in the erection of such a building, and to furnish, as it were, a scale by which to estimate the nature of the work, we shall proceed, before entering upon the subject of its general extent and arrangement, to describe the mode of construction of one of the 24-feet bays or compartments, taken at random from the side aisle adjoining the main avenue.

The description of a 24-feet bay commenced.

The exact situation of the four columns enclosing the space referred to having first been determined, holes were dug to such a depth as to lay bare the gravel; which extends, with scarcely a fault, over the whole surface of the site, at an average depth of between 2 and 4 feet. The size of the holes dug out for the foundations, and the quantity of concrete thrown into those holes in order to form a secure foundation for the superstructure, was determined by the estimated weight of that superstructure; and it was so arranged that, allowing for every possible contingency, under no circumstances should a pressure greater than 2½ tons per foot superficial be brought to bear upon the foundation.

The foundations.

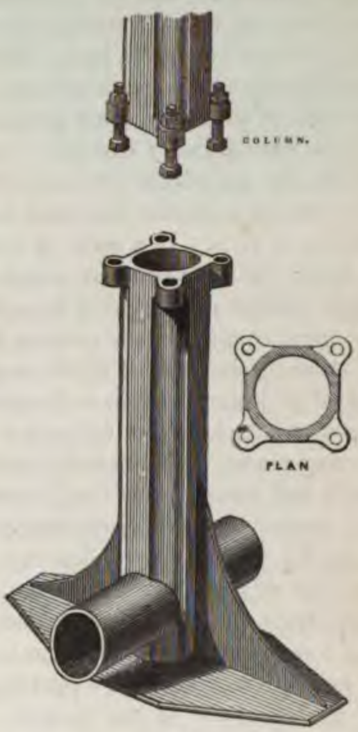
The base plates generally:

On the surface of fine mortar, with which the concrete was covered, was placed a casting, which has been technically called a *base-plate*. This casting is represented in fig. 3. The lower part consists of a horizontal plate, having attached to it a vertical tube, corresponding in form with the column which it serves to carry. The connection of the plate with this tube is strengthened by shoulders. The length of the whole of the base-plates being set north and south, in those through which roof-water is conducted, two sockets, issuing from the lower part of the tube, extend for some distance on each side in an opposite, or eastern and western direction. Into these sockets cast-iron pipes 6 inches in diameter are inserted, serving as drains to convey away the water; which, passing through the columns above, and through the hollow tubes of the base-plates, escapes into the pipes referred to, and finds its way to capacious drains situated in the centre, and at the extreme east-end of the building, which, in their turn, convey the water to the main sewer in the Kensington-road. At the upper portion of the tube of the base-plate, four projections with holes in them, are cast. At the foot of the column, which is of similar form to the base-plate, are similar projections, with corresponding holes. The upper face of the tube, and the under face of the column, being planed perfectly flat and true, the holes cast in the projections of the one exactly fit those cast to correspond with them in the other. Bolts having been then dropped through the holes in both are secured by nuts; and thus the column is attached to the base-plate, almost as rigidly as if the two had issued from one mould. As a proof of the singular accuracy with which the whole of these base-plates have been set upon their foundations, it may be mentioned that in every instance, the holes in the upper face or bearing surface of the base-plate, have precisely corresponded with those cast in the under face of the columns, at the exact height at which it had been pre-arranged that they should be fixed; and the two (columns and base-plates) have been united without involving the necessity of inserting any packing between them. Pieces of canvas only, cut to the exact form of the bearing surfaces, and dipped in white lead, have been interposed, with a view to insure the joints remaining perfectly secure and water-tight. The tops of the base-plates rise 3¾ inches above the ground-floor.

Those serving to convey away roof water;

How connected with columns.

Fig. 3.



Base Plate.

The columns:

The columns are 8 inches in diameter, and those on the ground-floor are 18 feet 5¼ inches high. The plan or horizontal section of these columns, which was the suggestion of Mr. Barry, is well adapted for its purpose, mechanically as well as artistically; for while it presents a pleasing variation from the ordinary circular form, the different flat bands upon it afford surfaces well suited for the connection and attachment of the necessary girders, which serve at once to support the galleries and roof, and to tie the various compartments of the building into one vast network. The columns are made hollow, in order to convey the water from the roof of the building; and the thickness of the metal of which they are composed varies, according to the weight each column is intended to support, from ⅜ of an inch to 1⅛ inch. The square faces already mentioned add, however, considerably to the sectional area of the metal, upon the amount of which the strength of the column in a great measure depends.

Their strength;

The extraordinary strength to resist compression in the direction of its length, which the cylindrical form conveys to any material, was illustrated by Professor COWPER, in a lecture delivered by him in the building to the members of the Society of Arts. In a series of experiments with a common quill, and even with a straw, Professor COWPER demonstrated the great force required to crush such slight objects, and, arguing from their comparative scale, illustrated satisfactorily the great strength of the columns in the building.

Their attachment to connecting-pieces.

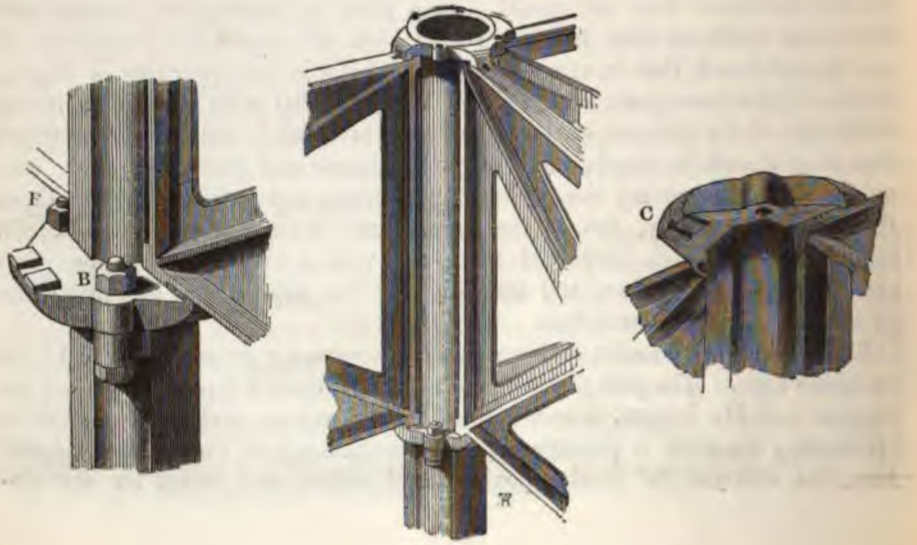
Beneath the capital, which surrounds the upper part of the column, are concealed projections similar to those at the bottom of the column. These projections serve to attach to the columns what have been technically designated as connecting-pieces. The peculiar office of the connecting-pieces is to afford, by a small and consequently easily modified casting, the means of securely retaining, and connecting in all directions, the various girders throughout the building.

The connecting-pieces;

The attachment to them of girders

In fig. 4, we have endeavoured to exhibit the peculiar formation of those portions of the connecting-pieces, which serve to effect the end desired. The projections, or, as they are technically termed, "snugs," are cast upon the upper and lower portions of the connecting-pieces, and act partly as brackets and partly as hooks, clutching over, supporting, and retaining, projections cast upon the ends of the standards of the girders. In order to retain the girders in a vertical position, and to prevent any lateral movement, the bottom face of that portion of the girder which rests upon the corresponding projection of the connecting-piece, is formed with what is called a tenon, which drops into a mortice-hole (A, fig. 4), cast in the face of the projection of the connecting-piece with which it comes in contact. The top face of the portion of the girder, over which the hook cast upon

Fig. 4.



the upper portion of the connecting-piece extends, has a groove sunk upon its surface; a groove corresponding to it in width is also sunk upon the projection of the connecting-piece (C, fig. 4), and a small piece of iron is introduced between the two. This iron acts as a key or dowel, and prevents the two surfaces sliding upon one another.

On the upper and lower part of the connecting-piece, between these projections which serve to retain the girders in their places, are cast holes, corresponding with those at the top of the lower columns, and at the bottom of the upper columns; through which bolts being inserted, nuts (BB, fig. 4), fastened to those bolts, secure the columns and connecting-pieces together. A similar arrangement would enable any number of columns and connecting-pieces to be attached to one another, so as to make up one long length.

(thereby connected with columns),

In order to make sure that the shaft thus composed of alternate columns and connecting-pieces, should be capable of maintaining itself in a perfectly vertical position, it was necessary that the whole of the surfaces of contact should be wrought perfectly true and flat. Every column and every connecting piece had, therefore, to be placed in a lathe; and the bed or surface at each end faced to a perfectly true plane. When the number of these columns, base-plates, and connecting pieces is taken into consideration, it may be easily imagined that the labour entailed by this apparently simple necessity could scarcely have been performed in any workshops but those provided with extraordinary facilities and resources.

Serving to stiffen shafts, consisting of alternate columns and connecting-pieces.

All bearing faces planed in lathes.

In the connecting pieces of the 24-feet bay we are now describing, projections are cast upon three sides, so that girders may be attached in three directions; and thus extend in every direction except that towards the nave, and the 48-feet avenue or court on the other side.

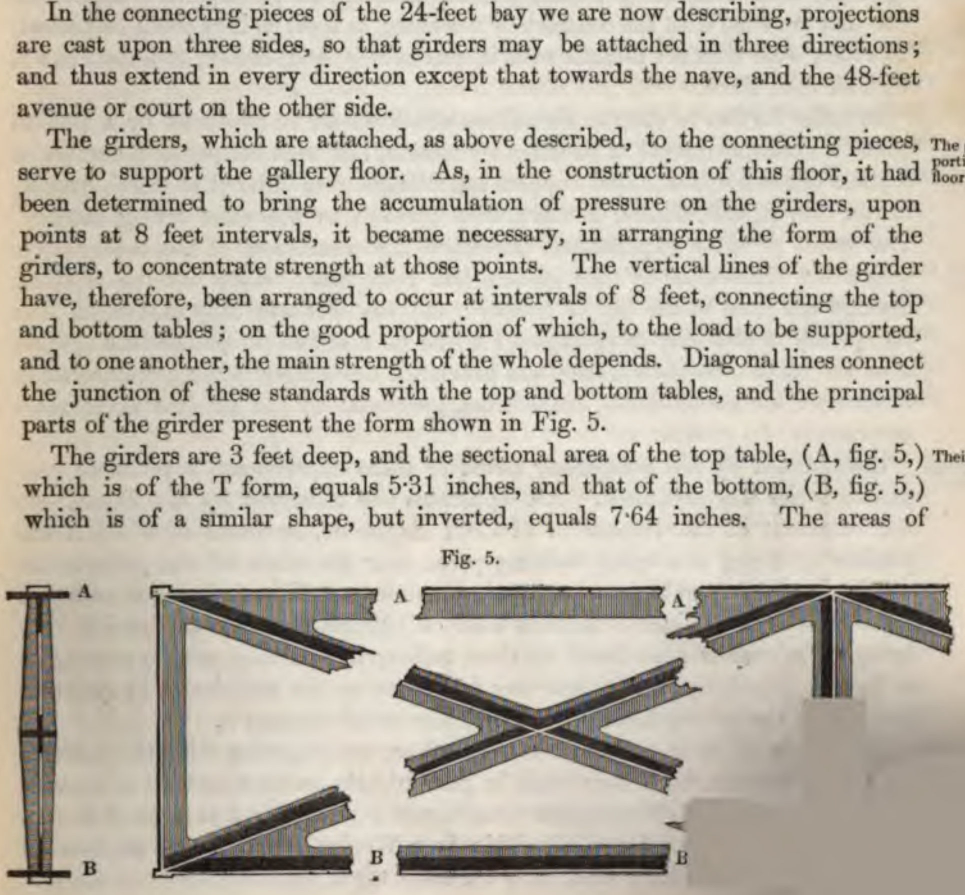
The girders, which are attached, as above described, to the connecting pieces, serve to support the gallery floor. As, in the construction of this floor, it had been determined to bring the accumulation of pressure on the girders, upon points at 8 feet intervals, it became necessary, in arranging the form of the girders, to concentrate strength at those points. The vertical lines of the girder have, therefore, been arranged to occur at intervals of 8 feet, connecting the top and bottom tables; on the good proportion of which, to the load to be supported, and to one another, the main strength of the whole depends. Diagonal lines connect the junction of these standards with the top and bottom tables, and the principal parts of the girder present the form shown in Fig. 5.

The girders supporting gallery floor;

The girders are 3 feet deep, and the sectional area of the top table, (A, fig. 5,) which is of the T form, equals 5·31 inches, and that of the bottom, (B, fig. 5,) which is of a similar shape, but inverted, equals 7·64 inches. The areas of

Their details;

Fig. 5.



the diagonal struts or standards, and ties, average 3·50 inches. The breaking-weight of the girders is calculated, and has been proved by various experiments, to amount to not less than 30 tons. Every one of the gallery-girders which has been used has been proved upon the ground to a strain of 15 tons; and, in exceptional cases, where it has appeared reasonable to expect that an accumulation of weight would have to be borne, their dimensions of thickness have been increased, and the amount of proof has amounted to no less than 22½ tons.

Their sufficiency to support a "dead weight,"

A few simple figures will clearly exhibit the sufficiency of these girders to support the loads that are likely to be brought upon them. A bay of gallery-floor, measuring 24 feet by 24 feet, contains 576 square feet; and it has been found by experiment, that it is impossible to load any surface with men to an amount equal to one hundred-weight per foot superficial. Assuming, then, 576 cwts., or say 30 tons, to be by any possibility accumulated upon such a bay of gallery-floor, the load will be distributed over four girders, any two of which have been found to be fully competent to support the load.

and a moving load. How tried :—

In thus estimating the sufficiency of the girders, the load they might possibly be called on to support has been considered only as what is called "dead weight," or load to which no momentum of any kind had been imparted. In order, then, to test them under the action of a moving weight as well, a series of experiments was instituted. A perfect bay of gallery, 24 feet square, was constructed, with connecting pieces, girders, flooring, &c., complete. Its surface was first crowded with the contractors' workmen, as tight as they could be packed. The men were then set to walk over it, run over it, and, finally, to jump upon it with all their force.

By workmen;

By soldiers marching

In order further to observe the effects which would be produced by a load to which a uniform, instead of an irregular motion, had been conveyed, a number of soldiers of the corps of Royal Sappers and Miners were ordered to march over it, to run over it, and, finally, to mark time upon it in the most trying manner. The result of these experiments developed the correctness of the theory upon which the dimensions of the girders had been based, since not the slightest damage was done to the bay of gallery; and the fact was fully evidenced, that the quality of elasticity or springiness in the floor served to protect the girders from the effect of sudden shocks, and prevented the danger of the communication to them of the accumulating momentum, generated by the possible isochronous movements of a crowd.

By rolling round-shot "in situ;"

Emboldened by the satisfactory result of these experiments, a yet more conclusive series was instituted. An apparatus was contrived by Mr. FIELD, the late President of the Institution of Civil Engineers, by means of which it was possible to draw, at a quick walking pace, over the whole of the galleries on which the public would have to tread, a number of 68-pounder shot, collected together so as to produce a uniform load of 100 lbs. per foot superficial. No damage whatever was produced by these rude tests, and they may be considered to have conclusively set at rest any doubts as to the sufficiency, in point of strength, of the gallery-floor, or of the girders which support it.

Who made by.

The whole of these girders are of cast-iron, and, together with the columns and similar castings, have been made in Staffordshire, at the foundries of the contractors, at the London Works, Smethwick, near Birmingham; at those of Messrs. A. and B. COCHRANE, of the Woodside Iron Works, Dudley; and at those of Messrs. JOBSON'S, of Holly Hall, near the same town.

The gallery floor resting on the girders.

The floor, which is supported by these girders, consists of cross-beams, so under-trussed with iron rods, shoes, and struts, as to distribute the whole weight that may be brought upon the floor pretty equally upon the eight points at which the ends of the beams rest upon the girders. Joists, stretching from the iron girders to the beams, and from one of the beams to the other, form the supports for a floor which is not more than 1¼ inch thick, but is at once amply strengthened, and rendered impervious to the passage of dust, by the insertion, in a groove cut in the edge of each floor-board, of iron-hooping, forming a tongue. A railing, designed by Mr. OWEN JONES, surmounted by a mahogany handrail, adds at once to the utility and the beauty of the gallery.

The columns between galleries and roof.

The columns which rise at the gallery level are 16 feet 7¼ inches long, and are surmounted by connecting pieces, similar in all respects to those occurring beneath. To these connecting pieces are attached, transversely in one direction and longitudinally in two, cast-iron girders of similar form and scantling to those we have described; their office being to maintain perfectly true and rigid, the vertical shafts which carry the eye upward in one unbroken line from the ground to the roof which they serve to support.

Strengthened by division into

As the strength of an iron column practically depends upon its length being limited, far more than upon its substance, the value of dividing the whole length of the shafts reaching from the gallery to the roof into two parts by these connecting-pieces, and thus reducing the length of the columns one-half, must be readily appreciated.

First tier.

Second tier.

Above the second tier of girders rise columns of the same length as those last mentioned, and on them again are placed connecting pieces, to which the girders supporting the roof are attached. These girders correspond with those supporting the galleries, and exactly resemble those forming the tier immediately beneath them, in every respect except their thicknesses. The whole of the girders on the upper tier have been proved in the building to a strain of nine tons.

Varieties of roof trusses.

By extending the area of our observations, we shall be enabled to include all the varieties of trusses employed to support the flat roofing over the whole extent of the building. It may be well, therefore, to consider that our original limitation to 24 feet square has been enlarged by the addition of a space of 72 feet by 24 feet, being a compartment of the roof over the nave; and of an area of the same *width* by 48 feet, being a portion of the roof over the avenue which extends from east to west, beyond the aisle on each side of the nave.

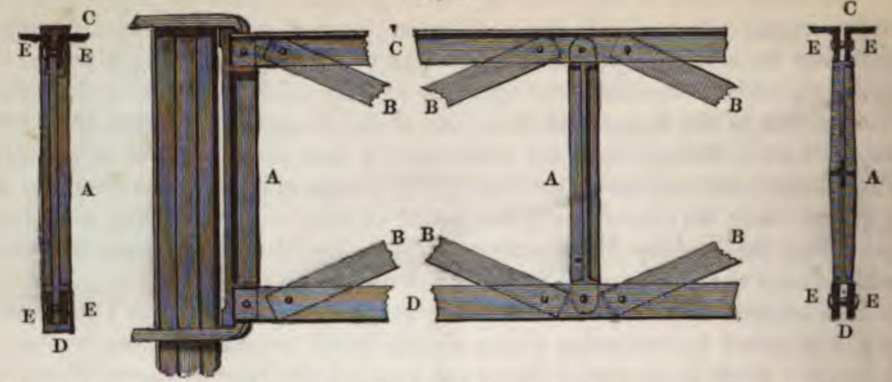
The 48-ft. trusses;

As we have stated that the latter of these portions of the building (the 48-feet avenue) rises to a height of two stories only from the ground, it will be manifest that its roof-trusses must be attached at the level of the girders which serve to stiffen the main shafts of the nave, namely, at a height of 44 feet from the ground. These 48-feet roof-trusses are attached to connecting pieces in a similar mode to that already described for the girders, with the exception that their vertical position is maintained by bolts passing through their standards and through the column, instead of by the system of keys as in the 24-feet girders.

Their details of construction.

In fig. 6 a representation is given of the principal parts of one of these trusses, which, it will be seen, is constructed for the most part of wrought iron; the few portions which are of cast iron acting only under compression. These trusses follow the general principle of division into 8-feet compartments; and, consequently, the cast-iron struts or standards (A A A A, fig. 6) occur in positions corresponding with those in the gallery-girders already described.

Fig. 6.



Diagonals of similar width on face (B B B B B B, fig. 6) connect them, and, consequently, an uniform lattice-like effect is obtained. The top table of these trusses (C C C, fig. 6) consists of two pieces of angle-iron, set at the distance of an inch apart, their total sectional area equalling 3 inches. The bottom table (D D D, fig. 6) consists of two bars of wrought-iron set at a similar distance apart, and increasing in sectional area up to 3·38 inches, as they approach the centre of the bearing. Between the angle-irons at the top and the bars at the bottom of the truss, are passed the ends of the cast-iron standards and those of the diagonal ties; the sectional area of the principal of the latter equalling 2·75 inches. Rivets, (E E E, fig. 6,) passing through the angle-irons and bars, the standards, and the ties, connect the whole into one truss, which acts upon the principle of a rigid top table under compression, and a suspension-truss beneath; so pressing up the standards or struts as to raise the centre of the upper table to a camber of 4 inches, one of the objects of which is to provide a sufficient fall for the roof-water. One of these 48 feet trusses, complete, weighs about 13 cwt., and when, under proof, having been loaded with a dead weight of 10 tons, deflected 3 inches, perfectly recovering its elasticity upon the removal of the weight.

The 72-ft trusses;

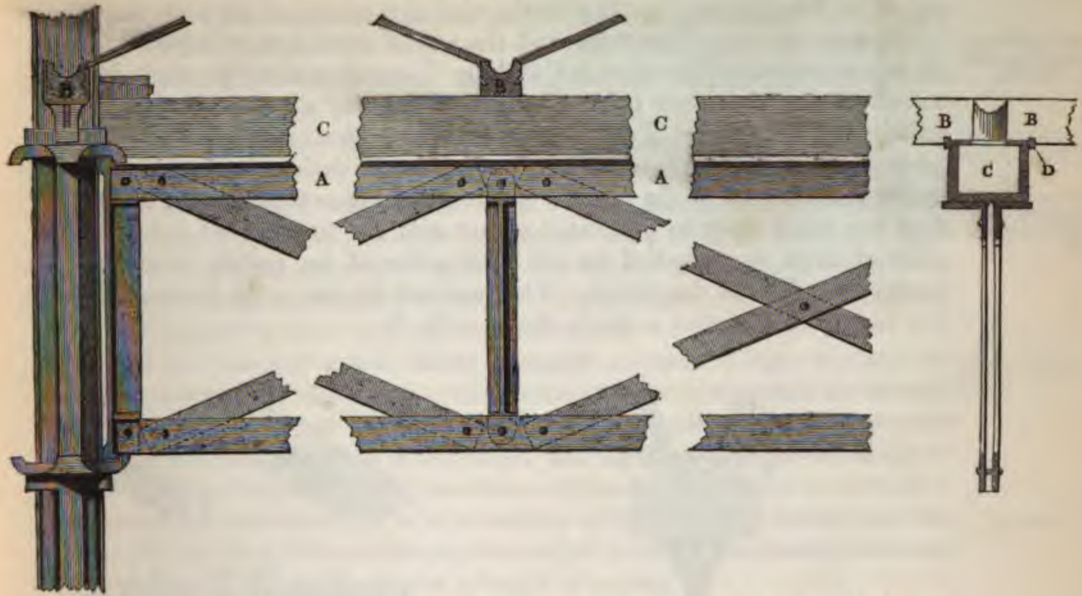
The clear width of the nave being 72 feet, it was of course imperative to construct a third description of truss, the depth of which should not exceed that of the connecting pieces generally throughout the building, namely, 3 feet, and yet sufficiently strong to support the larger weight of roof due to the increased area of roofing it was called upon to support. The construction of this larger truss, as shown in fig. 7, corresponds in every essential particular with that of the 48-feet truss already described, with the difference that the scantling of the angle-irons and bars is necessarily much increased, and that the total length of 72 feet is divided into *nine* 8 feet lengths instead of *six*. The weight of one of these trusses complete is about 35 cwts.; the sectional area of the two angle-irons (A A, fig. 7) being 5·71 inches; that of the two bottom bars, at their maximum, 6·75 inches; and that of the principal diagonal ties 3·38 inches. When loaded under proof, with a dead weight of 16 tons, it deflected 6½ inches, and entirely recovered its elasticity on the weight being removed.

Their details of construction.

The extra strong 72-feet trusses; their details of construction.

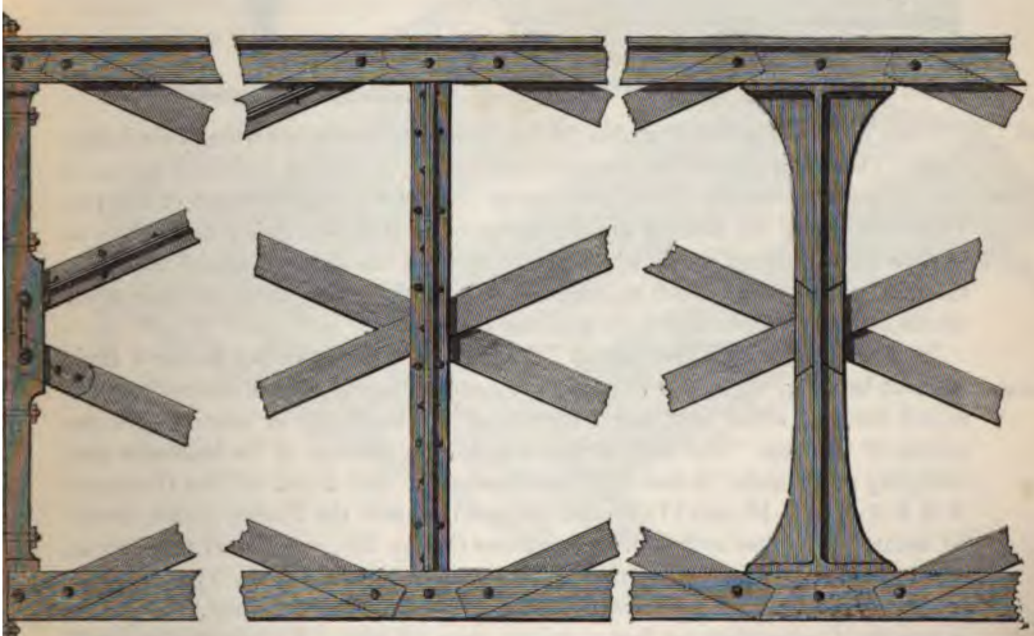
A repetition of one or other of these varieties of trusses suffices to support any portion of the flat roof of the building; but in order to carry the great extra weight thrown by the transept roof upon the last 72-feet trusses of the nave, where it intersects the transept, it was found necessary to employ trusses of double depth, extra lattice-work, and much increased scantling. The construction

Fig. 7.



of these trusses is shown in fig. 8. In order to give additional support to them, four extra columns have been attached to those situated at the intersection of the nave and transept.

Fig. 8.



The roof trusses, how connected longitudinally.

The direction of the 72-feet trusses of the roof of the nave being of course transverse to its length, and the trusses occurring at intervals of 24 feet, it became necessary, in order to perfectly steady them, that timbers (shown in section and elevation at B B, fig. 7) should be thrown across from one to the other, in the direction of from east to west. These timbers are introduced at intervals of eight feet, being placed directly over the vertical standards of the roof trusses.

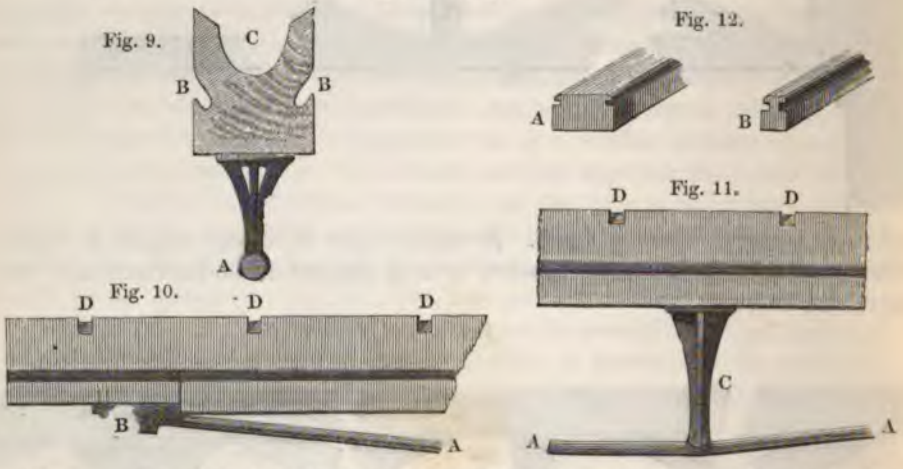
Box-gutters running transversely over trusses,

Between the top of the truss and the end of these timbers is placed a box (shown in section and elevation at C C C, fig. 7), running along the whole length, and attached to the upper flange of the truss, forming a gutter of considerable capacity, for the purpose of carrying the water away from the roofs to the hollow columns, through which it ultimately descends to the drains.

Connected longitudinally by Paxton gutters, &c.

The peculiar form of the timbers, spanning from truss to truss, and the offices they are called upon to perform, together with the fact that no less than 20 miles of them are required for the construction of the roofing, render them worthy of a detailed description. They are now known as the *Paxton gutters*. The form of their section is clearly shown in fig. 9.

Figs. 9, 10, 11, 12.



The Paxton gutters;

Their details of construction;

They consist of pieces of timber 24 feet in length, five inches wide by six inches deep. On the upper surface, a semicircular groove (C, fig. 9), 1⅝th inch radius, is cut, in order to receive the external water from the roofs. On each of the two vertical sides of the timbers an oblique groove (B B, fig. 9) is cut, in order to receive the condensed water, which, trickling down the inner surface of the glass, finds its way to these small channels, and is carried along them to their ends, where oblique cuts connect them with the box-gutters.

Their trussing;

As the length of 24 feet would be too great for the gutter to carry itself without bending, or, as it is technically termed, "sagging," the alternative presented itself of either very much increasing the scantling, or contriving some system of trussing. The former was rejected on account of its heaviness and unsightly appearance; it was therefore determined that a rod of iron (shown at A A A A, figs. 9, 10, and 11) should be passed beneath the Paxton gutter, should be secured to its two ends by cast-iron shoes (B, fig. 10), and should press up, at eight feet intervals in its length, two cast-iron standards (C, fig. 11), so as to effect a camber or rise in its whole length of 2½ inches. So trussed, the gutter is capable of supporting no less a weight than 1½ tons. A semicircular cut is given through the depth of the gutter at both ends, so that when two are placed end to end, the water may flow down to the box-gutters through a circular cavity. Twenty-seven notches are marked by a template, and cut on each side of the upper edge; a few of these are shown at D D D, figs. 10 and 11. The Paxton gutter, thus complete, is attached to a flanged iron plate, bolted on to the edges of the box-gutters, so that the parallel lines of gutter may form a continuous tie from the eastern or western ends of the Building to the transept, and so that, should the wood shrink in length, it may not pull apart and distort the sides of the box-gutters.

Their connection with the roofing;

Three of the notches referred to as being cut on each side of the gutters, are larger than the others, and on them bars of wood, 2 inches by $1\frac{1}{2}$ inch, grooved for glass on both sides, are notched down. These bars (shown at A, fig. 12) form principal rafters, and, being set at a pitch of $2\frac{1}{2}$ to 1, are fixed to a ridge 3 inches by 3 inches, grooved for glass on both sides. The angle at which these are fixed being the one which Mr. PAXTON, in numerous experiments, has found to be best adapted to the construction of similar roofs.

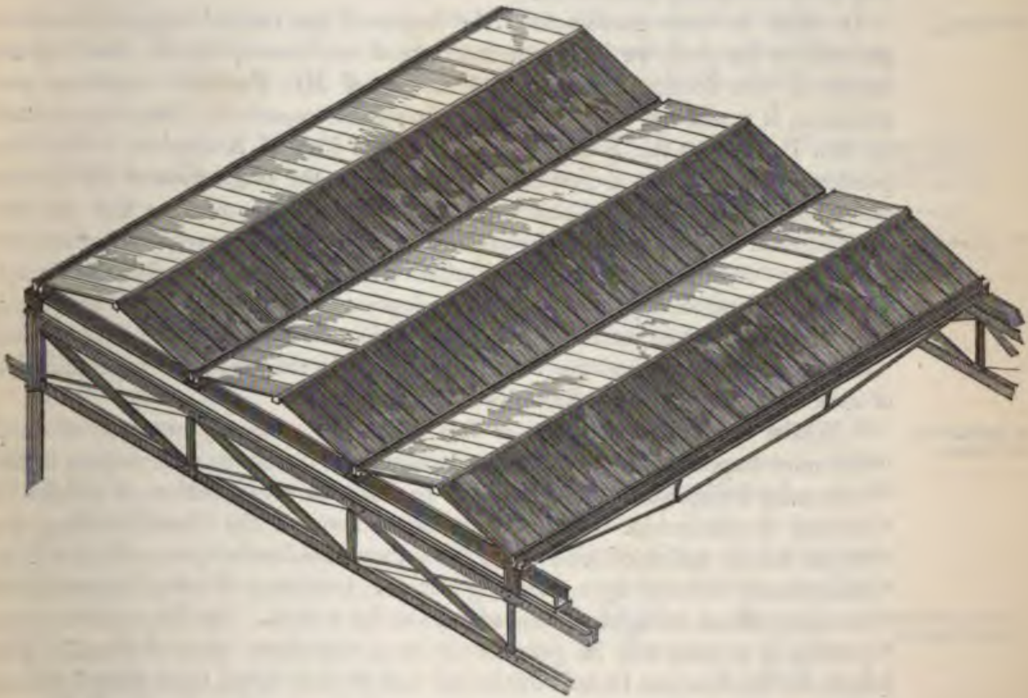
Reasons for fixing their pitch at 8 feet

One of the principal reasons which led to the adoption of eight feet and not more, as the pitch of these gutters from centre to centre, was, that the distance from ridge to gutter-edge might be covered with the largest sized glass that could be conveniently manufactured in one length, and that by that means the unsightly appearance, and frequently leaky condition, of joined glass, might be avoided.

A 24-feet bay of roofing;

The method of construction of a 24-feet bay of this system of roofing is shown in fig. 13, and from it the reader may be enabled to follow the description we are about to give of the construction of a length of roofing.

Fig. 13.



How constructed.

The gutters, principal rafters or main sash-bars, and ridge being fixed in place, the long edge of a sheet of glass, 4 feet 1 inch, by 10 inches, is inserted into the groove of the principal rafter, and a sash-bar (shown in section at B, fig. 12), 1 inch by $1\frac{1}{2}$ inch, also double grooved, is then put on to the other long edge of the glass. The sash bar is then brought down and secured at the top to the ridge, and at the bottom to the edge of the gutter; the lower edge of the glass bedding on putty about three-quarters of an inch wide. A slight blow to the lower end brings the upper edge of the glass home into the groove in the ridge. The glass being then pressed down, the putty is made good in the grooves externally, and by the repetition of this simple operation, the essentials of this system of roofing are constructed.

Lightness one of the advantages of Mr. Paxton's roofing.

One among the many advantages of Mr. Paxton's roofing is its extreme lightness. In the instance of that of the Exhibition Building, the whole of the roofing (the weight of the trusses that support it being of course deducted), weighs only 3¼ lbs. per foot superficial upon the average.

The canvas covering, how attached.

Its uses.

In order to mitigate the intensity of the light, and at the same time to assist in keeping the building cool, a canvas covering has been provided, extending over the entire area of the flat roof. The canvas is attached to the ridges, and allowed to hang down between them in a festoon. As one width of canvas is insufficient to reach from ridge to ridge, two are sewn together, the seam occurring in the centre, immediately over the Paxton gutter. The rain descending falls on the canvas, and clings to it by capillary attraction, creeping down until it arrives at the seam, where it passes through the canvas, and falls into the Paxton gutter; thus the danger of the passage of water which might take place through broken panes or imperfect putty-joints, is obviated, and the chances of leakage are consequently materially diminished.

The flooring,

In order to trace continuously the course of the vertical supports from the ground to the roof, we have not interrupted our description by detailing the nature of the flooring; but as that is one of Mr. Paxton's ingenious contrivances, it would not be right to allow it to pass unnoticed. In a paper, read by Mr. Paxton at the Society of Arts, on the 13th of November, 1850, that gentleman narrated the experiments which led to the origination of the present design, and stated that he had tried many methods, in order to find out the most suitable floors for the pathways of horticultural structures. After enumerating the objections to the use of stone and close boarding, he mentioned, that "he had ultimately been led to the adoption of trelliced wooden pathways, "with spaces between each board, through which, on sweeping, the dust at once "disappears, and falls into the vacuity below." He thus describes his application of these experiments to the Exhibition Building:—

as described by Mr. Paxton.

"Whilst the accomplishment of this point" (the speedy removal of dust) "was most important in plant-houses, I consider it doubly so with respect to the "Industrial Building, where there will be such an accumulation of articles of "delicate workmanship. Before sweeping the floors of the Great Building, the "whole will be sprinkled with water from a movable hand-engine, which will be "immediately followed by a sweeping-machine, consisting of many brooms, fixed "to an apparatus on light wheels, and drawn by a shaft. By this means a large "portion of ground will be passed over in a very short space of time." The boards for the floor are 1½ inch thick, laid half an inch apart, upon joists 7 inches by 2½ inches, which rest upon large timbers or sleepers, 13 inches by 3½ inches, at intervals of 8 feet apart. Through the interstices left between the boards the dust passes, and the merits of this system of flooring are thus summed up by Mr. Paxton:—"It is very economical, dry, clean, pleasant to walk upon, admits "of the dust falling through the spaces, and even when it requires to be

Conclusion of notice of general construction of one 24-feet bay.

" thoroughly washed, the water at once disappears between the openings, and the " boards become almost immediately fit for visitors."

General dimensions and quantities.

Having now endeavoured to furnish the reader with sufficient detail of a small portion of the building, to enable him to use it as a scale, whereby to estimate the quantity of labour represented by a structure of the general dimensions we are about to enumerate, it may be stated that the total area of the ground floor is 772,784 square feet, and that of the galleries 217,100 square feet. The galleries extend nearly a mile in length. The total cubic contents of the building are about 33,000,000 feet; there are nearly 2,300 cast-iron girders, and 358 wrought-iron trusses for supporting the galleries and roof, 30 miles of gutters for carrying water to the columns, 202 miles of sash bars, and 900,000 superficial feet of glass. The width of the nave is, within 10 feet, double that of St. Paul's Cathedral, whilst its length is more than four times as great.

The transept.

Its roof.

With a general knowledge of the construction of the nave, we may imagine the visitor, returning to the transept, better qualified to enter into the mechanical details, and the amount of difficulties presented to his notice, by that great feature of the building. The arrangement of the vertical shafts, galleries, &c., is similar to that of the nave; the main points of difference commencing at the level of the flat roof. It will be remembered that the spaces to be covered at a height of 64 feet from the ground, are, firstly, a main avenue, 408 feet long by 72 feet wide; and secondly, two aisles, each 408 feet long by 24 feet wide. It was determined that a semi-cylindrical vault should span the larger of these areas, and for that purpose semicircular ribs (see Plate I.) extend from side to side, their ends being inserted into the hollow columns, whilst they are steadied by the insertion between, and at right angles to them, of stout timbers, 9 feet 2 inches from one another, acting as purlins.

Construction of the ribs of the transept roof.

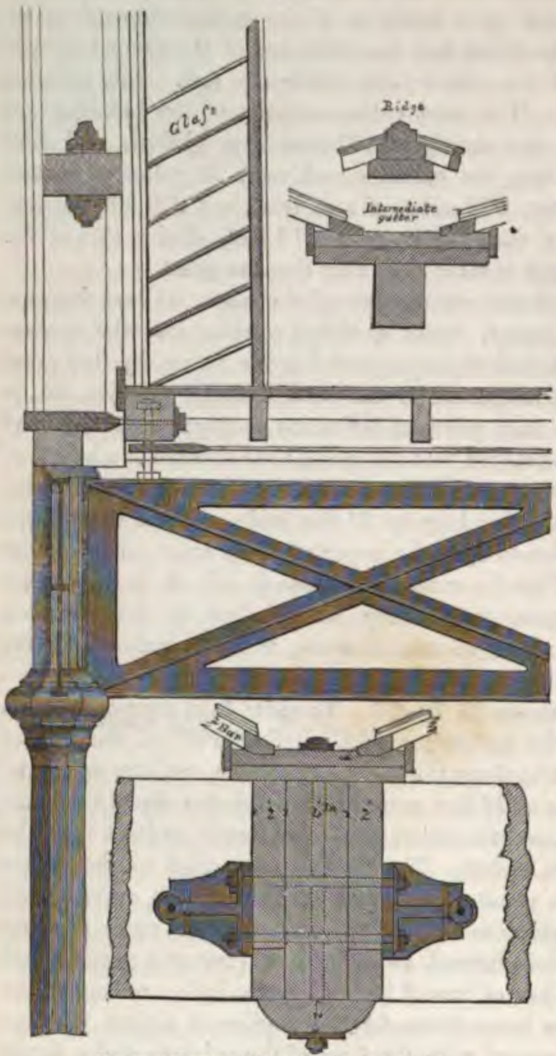
Description quoted from "Transactions of Institution of Civil Engineers."

The transept roof, how constructed.

The structure of the ribs is shown in fig. 14. To quote from a paper descriptive of the building, read at the Institution of Civil Engineers, on the 14th of January, 1851, " they are made in three thicknesses of timber, cut into segments, " 9 feet 6 inches long, of a circle of 74 feet extreme diameter, the centre thickness " being 4 inches by 13½ inches, and the outer, or flitches, breaking joint with the " centre, being 2 inches by 13½ inches. The flitches are nailed to the centre " thickness, and ⅝ths inch bolts, about 4 feet apart, on the segment, traverse and " bind together the three thicknesses. On the extrados, or outer circum- " ference of the wooden arch thus formed, two planks serving as a gutter board " 11 inches by 1 inch, and a bar of iron 2 inches by ⅜ths inch, are bent to the " curve; and on the intrados, or inner circumference, a piece of timber, 7 inches " by 2 inches, moulded to correspond with the form of the columns, and a bar of " iron, 3½ inches by ⅜ths inch, are also bent to the curve. Bolts, at intervals " of 2 feet from centre to centre, passed through the depth of the rib, unite these " additions to each other, and to the main rib, which, thus increased in scantling, " measures, complete, 1 foot 6 inches by 8 inches." In order to perfectly connect these ribs, so that any force exerted, by wind or other causes, tending to the displacement of any one of them, may be distributed over the whole mass, iron rods have been set diagonally, forming a complete reticulation over the whole inner surface of the roof. The main ribs are fixed spanning the transept, at intervals of 24 feet from centre to centre. Each of these 24 feet widths is divided into three parts, and at 8 feet from one another, and from the main ribs, minor ribs are introduced. Between them again, but being semicircles of larger diameter, are fixed small ribs of wood, which being connected with the main and minor ribs by means of sash bars, become available as ridges. The space between them and the ribs is glazed and finished on the same system as that adopted in the flat roof of the building, the sash bars being set at an oblique angle, or "herring-bone" fashion, in order to assist the conduction of the water, and prevent its lodging against the lower putty bed of each pane of glass over which it trickles.

Fig. 14.

Transept Ribs.



Section of Transept Rib, and springing of ditto.

The lead flats.

Along the summit of this semi-cylindrical vault runs, from north to south, a narrow lead path, in order to afford access to the apex of the roof, and to provide a means of lowering down workmen to repair any damage that may possibly happen to it. As the quantity of water discharged from this vault must necessarily be considerable, it was deemed advisable that the 24-feet aisles on each side of it should be covered with lead flats, instead of the ordinary glass roofing. These lead flats presented also the further advantage of being so completely connected, as to form solid abutments, steadying the feet of the ribs. In order to convey any pressure in the way of thrust, that the ribs might exert, to those points best capable of resisting strain, horizontal trusses of wrought-iron were constructed beneath the lead flats, consisting of bars capable of being keyed up at any time from the lead flats, and thus any tendency to movement, on the part of any of the ribs, would be immediately transferred either to the extreme north and south ends, where their feet are securely tied together by the cast-iron girders which cross the transept at those points; or to the angles where the transept intersects the nave, and where the whole force of the *vis inertiæ* of the nave roof would serve as abutment.

The general effect produced by this semi-cylindrical roof covering the large elms beneath, is shown in Plate I.

The external enclosures.

The external enclosures or walls, as seen from within, on the two upper stories, consist of glass in wooden sash frames, inserted between columns 8 feet from centre to centre, and louvre frames for ventilation, surmounting the sash frames. On the ground story, boarding takes the place of the glass; and the height being 24 feet instead of 20 feet, an additional tier of ventilators is inserted. The columns at 24 feet apart being of iron, the intermediate ones, dividing that width into 8 feet compartments, are of wood.

The sash-frames.

As no less than 1,500 sash frames have been used, they may justify a few words of description. To quote again from the Transactions of the Institution of Civil Engineers, we learn that " the sash frames are 2½ inches thick, with seven " bars in their width; the bars being 2⅜ inches deep, double grooved for glass. " Wrought-iron bolts, ⅜ inch diameter, pass completely through the sash bars and " sash frames, at the points where they are attached to the columns; and thus a " chain tie is kept up all round the building, in order to prevent displacement of " the sashes either bodily or in portions, by the pressure of the wind. To further " guard against the same action, timber bridges, 3½ inches by 1½ inch in the centre, " are fixed across the middle of the length of the sash; and at the internal " angles, where the wind will exert its greatest force, iron rods, half an inch in " diameter, are fastened from column to column, pressing against the wooden " bridge, and converting it into a continuous strut, bearing up against any force " applied to the exterior of the sash. In order to glaze the sashes, the glass " is slipped down between the bars, and provision is made for mending, by " causing one groove to be cut deeper than the other, so that the glass may be " slipped in from one side, and puttied into its exact place. A similar pro- " vision is made for mending the roof glass."

The action of wind on them, and on the building.

As whatever lateral force the wind may exert upon the building will be principally received by these sashes, it may not be inappropriate, in considering them, to advert briefly to the general question of the action of wind upon the building.

On the 15th of January, 1851, a meeting was held at the Society of Arts, at which Mr. Fox, one of the contractors for the building attended, to afford the members of that Society an opportunity of asking any questions as to the general points of stability and durability, on which they might desire information.

How described by Mr. Fox.

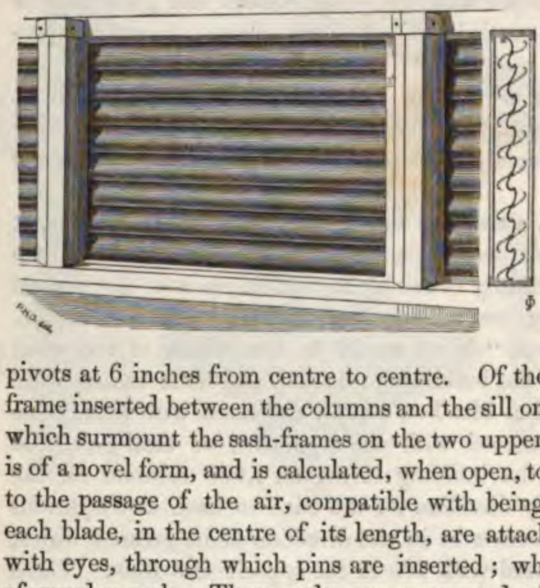
One of the questions proposed was, " What would be the effects of the wind " on such an extensive surface as the building presented, and what means were " taken to counteract them?" and as Mr. Fox's reply embraced with remarkable clearness the principal facts connected with the argument, we shall give it at length. Mr. Fox replied " that the building rested on 1,060 columns on the " ground floor, and the most likely direction for the wind to have any injurious " effect on the building, must of course be in the direction of its greatest width, " which was 1,800 feet as compared with 400 in the opposite direction. These " columns rested on cast-iron plates based upon concrete; and there was no possi- " bility of their rocking about without the base-plates being broken. Above " these plates were sleepers, that carry the floor. They were 13 inches in depth, " and fitted accurately up against the two sides of the column, and running " transversely from one side of the building to the other; so that it would be " very difficult to conceive that one of these columns could be possibly upset " until it was actually broken in two. And again, at the top the columns are " united together by cast-iron girders 3 feet deep, and four columns are framed " together, very much as they would frame a table. Now to break the column,

" they must exert a force equal to that of twice the transverse strength of the " column. According to the experiments it was found that six tons was the " bearing weight, and 12 tons the breaking weight of the columns in the centre. " Now, 1,060 columns multiplied by six tons, the bearing weight, was equal to " 6,360 tons; so that it would be necessary to exert a force equal to 6,360 tons, " at a height of 24 feet from the ground, before they would be able to blow down " the building, and he was now treating of the building independently of its " bracings. The greatest force of wind ever known had been computed at 22 lbs. " to the superficial foot. Taking 28 lbs. as the force, and assuming that they " could have a gust of wind which would strike the whole side of the building " from top to bottom at the same moment, the total force which could be brought " against it would be from 1,400 to 1,500 tons. Now, they had got power to " resist it of 6,360 tons, not taking into account the bracings and the other con- " structions and offices which were within the building, and which must of " course add to its strength. The building had been tested in the late gale, when " Colonel Reid ascertained that the force of the wind was 19½ lbs., and it did " no harm whatever; and that was at a time when the roof was not on, and the " building was quite exposed."

The ventilators.

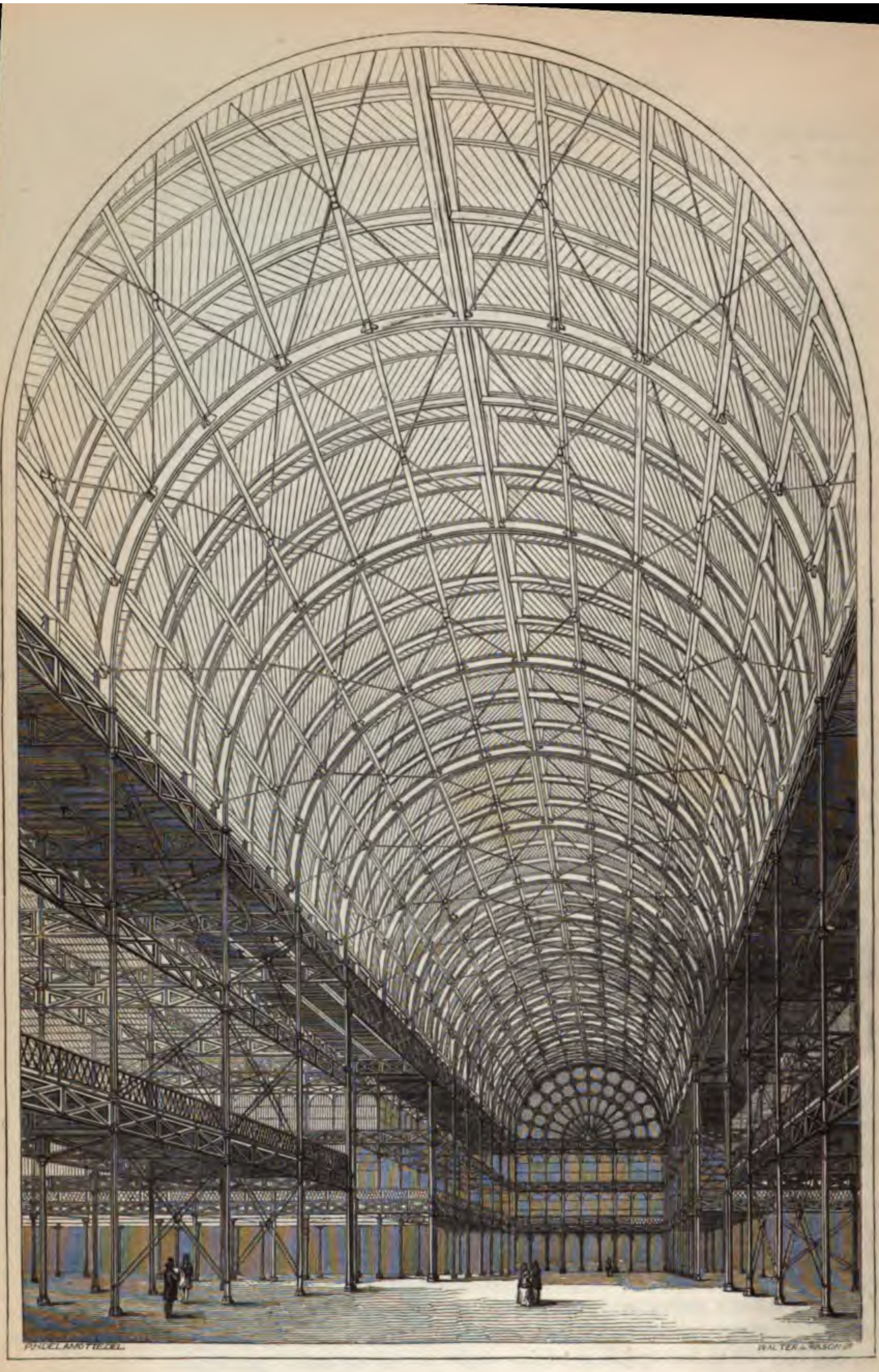
The ventilators, to which allusion has been made, and which are shown in fig. 15, fulfil an important office in the building, acting as the organs of respiration to the whole body. The total surface of ventilation is nearly 50,000 superficial feet, and the whole has been so arranged, that, by the application of one man's strength, at about 90 different points, the whole may be opened, closed, or set and secured at any desired angle, simultaneously. The ventilators themselves consist of galvanized iron blades of an S form, 6¼ inches wide, fixed on pivots at 6 inches from centre to centre. Of these there are eight in the wooden frame inserted between the columns and the sill on the ground floor, and six in those which surmount the sash-frames on the two upper stories. The section of the blade is of a novel form, and is calculated, when open, to afford the minimum interruption to the passage of the air, compatible with being weather-tight at all times. To each blade, in the centre of its length, are attached small iron brackets furnished with eyes, through which pins are inserted; which pins are secured in a species of wooden rack. These racks are connected with cranks attached to iron rods, to which a movement of torsion is conveyed by screws and powerful levers. A moderate exertion of the strength of one man applied to one of these levers, suffices to regulate, with facility, no less than 600 feet superficial of ventilation.

Fig. 15.



The decoration.

Hitherto the building has been considered only in a structural point of view. The vivacity of any impression it may convey to the casual visitor will, however, probably depend more strongly on the system of decoration which it has received from Mr. Owen Jones than on any of the constructional details we have been describing. That gentleman, whose studies in Egypt and in the East generally,


P.H.DELAMOTTE DEL.
WALTER & MASON SC.

25. VIEW OF THE INTERIOR OF THE BUILDING FROM THE SOUTH ENTRANCE.

[*Plate* I., p. 57.

in Spain, and in other countries of Europe, had qualified him for the task, was enabled at an early stage in the progress of the building, to foresee the effect of the combination in perspective of its various lines. Serious apprehensions were at first entertained as to the propriety of the application of colour, usually devoted to the decoration of extended surfaces, to what were asserted to be lines only. Mr. JONES was, however, enabled to estimate how far the merging in distance of those lines would give them the appearance of surfaces, and the three tints of blue, red, and yellow have been distributed by him over the columns and girders, so that as the surfaces blended in perspective, each column has allied itself in colour with its fellow column, each vertical face of girder with the vertical faces of its fellow girders, and each soffite, or underside, with its fellow soffites. Breadth and distinctness were given to the enunciation of each colour. The light of the sky appearing through the interstices of the roof, the principal portions of which have been tinted of a delicate blue, unites with the colour, giving it at once air and brilliancy. The effect of this mode of treatment has been to add considerably to the apparent elevation of the building. By varying the colours of the vertical and of the horizontal lines, and retaining each uniformly, the eye is enabled to detect, at even the greatest distance, the direction and position of every part of the construction, and thus the otherwise endless confusion of the complexity of lines, is reduced to order and simplicity.

The refreshment rooms, &c.

Although a provision for the gratification of the intellectual tastes of the visitor has been the main object in the formation of the Exhibition Building, ministering to his more ordinary appetites has not been lost sight of. Commodious refreshment rooms, with the accompaniments usually connected with them at large railway stations, have been provided around the trees at the northern extremity of the transept, and adjoining open courts towards the eastern and western extremities of the buildings, where the presence of the trees dictated their location.

The offices.

The official business connected with the conduct of the Exhibition rendered necessary the employment of a large staff of clerks, &c., for whom, and for the juries, &c., a considerable extent of accommodation has been provided in offices placed on each side of the southern entrance.

The entrances and exits.

We have supposed our visitor to enter on the south side; admittance may, however, be also gained at the eastern and western ends, where similar vestibules, 72 feet by 48 feet, afford accommodation for turnstiles, check-takers, &c. Disposed at nearly equal distances from one another, on the four sides of the structure, are 15 exits, by passing through either of which the building may be quitted.

The exterior of the building.

In issuing from its precincts the visitor will pass through the gates of an iron railing designed by Mr. OWEN JONES. Retreating to some distance, he will be enabled to take in a general impression of the whole building, as shown in fig. 16. From the north-west angle the most picturesque view is to be obtained, and from that position may be best appreciated the grand effect produced by Mr. PAXTON's happy idea of raising the semi-cylindrical vault of the transept roof, above the tiers of terraces which extend on either side of it. For much of the grace of proportion and beauty of form, which from this point of view the visitor cannot fail to notice, the building is indebted to Mr. BARRY. Upon the form and distribution of the arches and filling-in frames, as well as of the columns, the suggestions of that gentleman exercised a happy influence.

The details of an 8-feet bay of elevation.

In fig. 17 we have given a view of a bay of the building, 8 feet in width; and from that and the other illustrations a tolerably correct idea may be formed of the nature of its external construction.

The spaces enclosed at eastern and western ends.

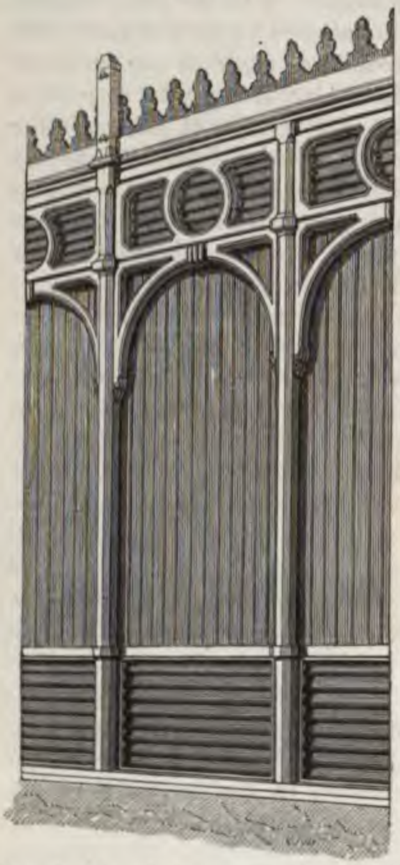
At the east and west ends considerable spaces have been enclosed, for the purpose of affording accommodation for large objects, the weight or dimensions of which precluded their admittance into the building.

The boiler-house.

The water supply.

At about 155 feet from the north-west angle, a structure, 96 feet by 24 feet, has been erected for the purpose of containing the boilers for generating steam, to be supplied to give motion to the various machines requiring to be exhibited in operation. The external appearance of this building precisely corresponds with that of a portion of the main edifice of similar dimensions. It contains five boilers, equal to 150-horse power, and a large tank, serving as a balance-head to the water-supply. This supply consists of a 6-inch main, entirely surrounding the building; upon it, at intervals of about 240 feet, are placed fire-cocks; and at different points in its circuit 16 4-inch branch-pipes enter the building, and lead so far into the interior, that fire-cocks placed upon their ends are so situated that circles of 120 feet radius drawn from each of them would intersect one another. The mains running on the north and south sides of the building are connected across the transept by a 5-inch main, from which, near the centre of the building, pipes diverge, leading east and west, for the supply of the various fountains placed upon the central line of the nave.

Fig. 17.



Conclusion of Part I. of subjects—"The building as it stands."

Commencement of Part II.—"Its creation."

Having endeavoured to convey some general idea of the nature of the building as it at present stands, it may be desirable to trace the successive steps by which it has grown into the form it now assumes.

Arrangements subsequently to acceptance of tender.

When it is remembered that the tender for its construction was not accepted by the Royal Commissioners until the 26th of July, 1850, that possession of the site was only obtained on the 30th of the same month, and that the first column was fixed on the 26th of September, it will be manifest that into the intervening period must have been crowded arrangements, which, under ordinary circumstances, would have required at least double that period for their completion. Details of construction had to be settled, elaborate calculations as to the strength and proportions of the several constituent parts to be made, machines for economising labour to be devised, contracts for the supply of materials to be entered into, and thousands of hands set actually to work. How unintermitting since that period the labour must have been is testified by the fact, that the opening of the Exhibition takes place on the 1st of May, the day originally appointed.

Hoarding commenced on site being given up to contractors.

On the ground being given up to the contractors, the first work undertaken was the construction of a hoarding to inclose the whole area of the site. This hoarding was formed by the insertion into the ground, in pairs, of the timbers ultimately to be used as joists. Between each pair of uprights were slipped the ends of boards, ultimately to be used as floor-boards; and these were secured by attaching together the two ends of the joists extending above them. Thus the expense of the hire of waste boarding was avoided; the timber composing the hoarding was completely uninjured; and the celerity with which the whole area was surrounded was truly remarkable.

The setting out.

The task of setting out the plan of the building was intrusted to Mr. Brounger; and the extreme accuracy with which the situation of every column was fixed, and the adjustment of every level was performed, reflects credit upon that gentleman.

How proceeded with.

In order that the measurement of 24 feet, upon which the accuracy of the whole plan depended, might be indicated with extreme precision, poles of thoroughly-seasoned pine were fitted with gun-metal cheeks, or small projecting plates, the ends of the poles extending a few inches beyond the cheeks. The measurements were taken by laying one pole on the other, so that the inner edges of the gun-metal cheeks, set at precisely 24 feet from one another, might be brought into contact. Thus the danger of any error, arising from the ends of the poles becoming damaged in use, was avoided. Stakes having been driven into the ground to indicate approximately the position of the columns, their precise centres were ascertained by the use of the theodolite, and marked by driving a nail into each stake at the exact point. When it became necessary to remove these stakes, in order to dig out holes for the concrete foundations, an ingenious method was resorted to, for at any time identifying the position occupied by the nail which had been removed. To effect this a right-angled triangle was framed in deal, at the two ends of which saw-cuts were made. Previous to the removal of the stake, the apex of the triangle was set to the nail indicating the situation of the centre of the column. Two other stakes were then driven beneath the saw-cuts, and two nails driven in at the ends of the saw-cuts. The wooden triangle being then removed, the centre stake was withdrawn, the hole made, and the concrete thrown in. The height of the surface of the mortar, varying with almost every column, was regulated by pegs driven to the correct level under the direction of Mr. Brounger. Another triangle of a somewhat similar character to, and having saw-cuts in the same position as, the one already described, having two of its angles adjusted to the two stakes remaining in the ground, determined the exact position in which the base-plates had to be fixed.

Castings examined and girders proved—how.

As every casting was delivered on the ground, it received a careful examination, and an immediate coat of paint. The girders, upon the perfect soundness of which the stability of the galleries and roof mainly depended, were subjected to a rigorous test, in a machine arranged for the purpose by Mr. Charles Heard Wild. One of Mr. Henderson's patent cranes was so placed, that, on a waggon containing girders being brought beneath its range, a girder was lifted from the waggon, and deposited upon a weighing apparatus. An account having been
taken of its weight, the girder was again lifted by the crane, and carried
to an extremely strong frame, the two ends of which corresponded in
dimensions to the connecting pieces with their projections. The gird
securely confined in these clutches, a force was exerted upon it at the
upon which the weight of the floors and roofing would have to be

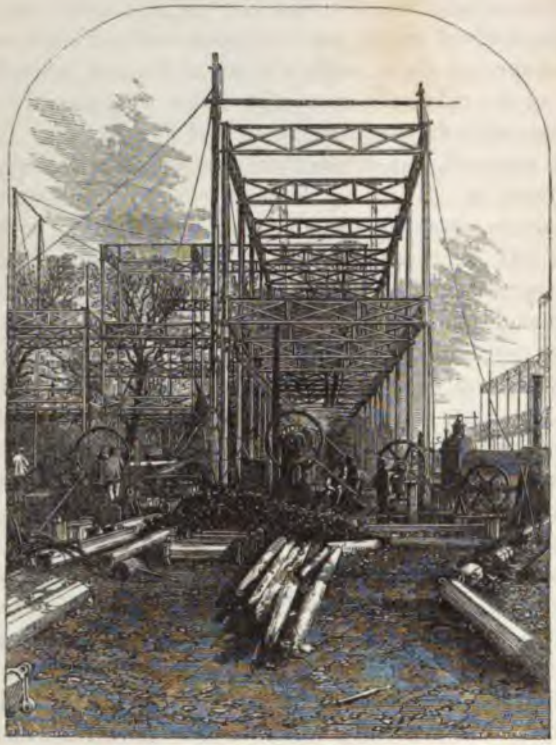
to say, immediately over its vertical lines. The force thus communicated was applied by two pistons, forced upwards by a modification of BRAMAH's hydraulic press; the principle of which, it will be remembered, depends upon the power gained by forcing water (by means of a small piston) into a strong cylinder in which a larger piston works; the power being increased in the proportion borne by the area of the piston to be raised to the area of the small piston. A registering apparatus affixed to the pipe leading from the force-pump to the testing-machine, afforded the means of adjusting the pressure exercised by the hydraulic press. A careful observation of this apparatus conveyed the assurance, that every girder, according to its ultimate destination, was proved to a strain of either 9, 15, or 22 tons. After testing, the girder was released from its confinement, again raised by the crane, and stacked in a convenient place ready for removal. So admirably were the various arrangements made for conducting these operations, that it was possible for a girder to be lifted from its waggon, weighed, secured in the testing-machine, proved, released, again raised, and finally deposited, in less than four minutes.

The columns and girders, how raised,

In order to elevate the columns to their places, what is known in technical language as a pair of shear-legs was employed. This simple apparatus consists of two poles lashed together at their heads, and maintained in a steady position by ropes extending, from the apex of the triangle formed by the base-line of the ground, and the inclination of the poles, to one another, to stakes driven into the ground at a considerable distance. From the apex of the triangle a series of ropes passing over pulleys were suspended perpendicularly; and, by means of this "fall," the majority of the columns, girders, and other heavy portions of the construction, were elevated to their places. The operation of raising girders is shown in the view, fig. 18, but on so small a scale as to convey only an imperfect idea of its detail. Modifications of the simple apparatus described sufficed to hoist almost every part of the necessary iron-work. A connecting-piece was attached to each column previous to its elevation; and so soon as two columns with their connecting-pieces were fixed, a girder was run up, slipped between the projections of the connecting-pieces, and secured in its place. An opposite pair of columns having been similarly elevated, another girder was attached to them; and thus two sides of a square were formed, and maintained in a vertical posi-

steadied,

Fig. 18.



tion by poles acting as supports to them. Two other girders being then hoisted, and slipped between the connecting-pieces on the remaining two sides of the square, a perfect table was constructed. The "shores" or supports were then removed, together with the shear-legs, and the whole apparatus was at liberty, for the purpose of recommencing a similar operation in an adjoining 24-feet bay.

and fixed.

The second and third stories commenced without scaffolding—how.

When a sufficient number of these bays had been completed, starting from the intersection of the nave and transept, to warrant the addition, the hoisting of the columns for the first floor was commenced; more lofty shear-legs being of course employed. The extension of the ground-floor structure proceeding, as that of the first floor was carried on, a base was in turn afforded for the columns of the third tier; and thus the iron frame work of the whole building rose from the ground, firm and secure, without involving the necessity of any scaffolding whatever.

The preparation of the other work

While these operations of actual structure were being carried on, under the immediate superintendence of Mr. JOHN COCHRANE, the work of preparation was yet more vigorously pushed. The manufacture of the Paxton gutters, and the application of machinery to their formation, is so interesting, as to warrant a somewhat lengthened notice.

The gutter-making machine

In the year 1837, when Mr. PAXTON commenced the construction of the Chatsworth conservatory, in which similar gutters were employed, machinery had not been brought to bear upon their construction. By the use of a contrivance, the details of which were arranged by Mr. COWPER, a gentleman in the employment of Messrs. FOX and HENDERSON, a total length of upwards of 2,000 feet per day has been turned out, for many successive days. The pieces of timber destined to form the gutters are sawn into lengths of 24 feet, 6 inches deep, and 5 inches thick. Three of these pieces are fixed on the frame of a planing-machine, and by it are worked true and square. In figures 19, 20, 21, and 22 are given representations of the details of the gutter-making machine, erected at Messrs. FOX and HENDERSON'S workshops, near the Thames, at Chelsea. Fig. 19 is a side view of a block of cast-iron, to which steel cutters (AAAA) are attached by bolts and nuts (BBBB). Four blocks, of similar construction, are fixed to four spindles, and by the action of drums on the same spindles, set in motion by bands moved by a steam-engine of 20-horse power, the blocks are made to revolve with extreme rapidity. Any piece of timber exposed to the action of these cutters, must obviously be scooped out into the form of the outline of the cutters attached to each block. By modifying the form of the cutters almost any variety of section can be given to the timbers brought into contact with them. In the present case, the four sections A, B, C, and D (fig. 21), represent the successive action of the four sets of cutters lettered to correspond with them (on fig. 20), by means of which the larger cavity for the rain water, and the two smaller channels for the condensed water, are formed. The part removed by each set of cutters is shown by the hatched lines.

Fig. 19.

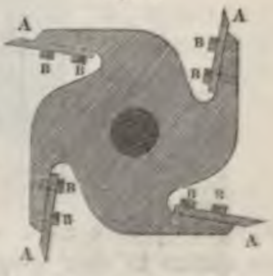
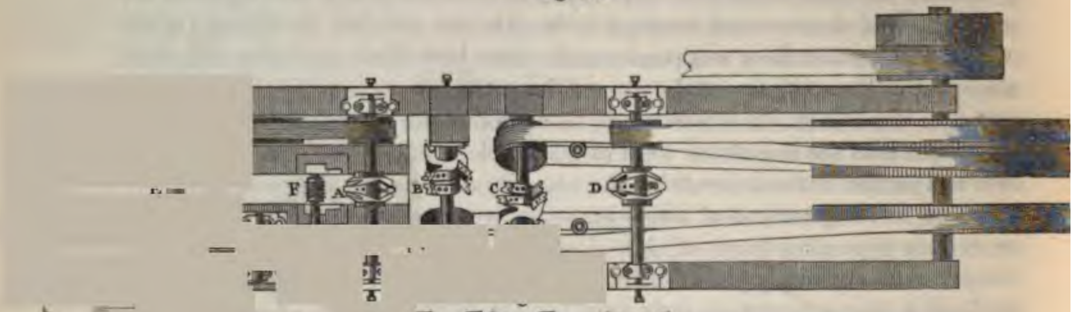


Fig. 22 represents a plan of the machine, looking down from above upon the gutters, the gutter being removed in order to show the action of the cutters more clearly.

Its mode of

The operation may be explained as follows:—The piece of timber, properly squared, is placed upon the roller marked E, it is then pushed on until it in contact with the roller marked F, the projecting points on which so far seize it as to propel it forward to meet the rapidly revolving set of cutters marked A. Passing onwards to B, it is subjected to a second action. By C a third operation is performed, and in passing through D, a perfect form is given to the piece of timber. Thus, while, the end beyond D presents the perfect section of a finished gutter, the other end, which has not yet passed the set of cutters at A, remains in its original square form. In fig. 22, a vertical section is given, exhibiting the precise angle at which the cast-iron blocks are made to revolve, and the cutters to clear away the timber before them. O shows the section of the gutter acted on by the cutters, N the holdfast by which the gutter is kept in its place during the operation. By the use of this machine three feet of gutter can be made per minute, and, working night and day at this rate, the whole quantity required was completed in two months.

Fig. 20.



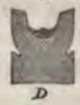
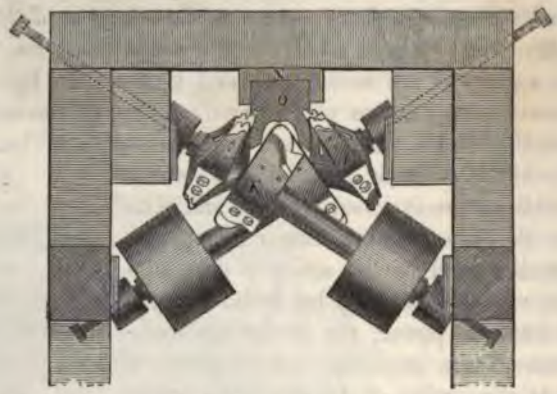


Fig. 21.

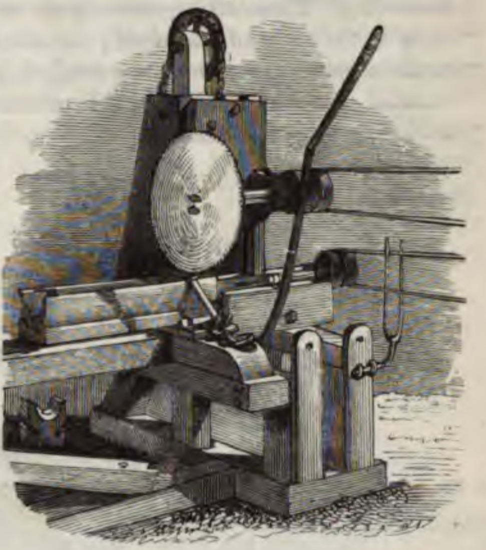
Fig. 22.



The Paxton gutters—how completed for use on the ground.

The Paxton gutters, thus prepared, were delivered on the ground, and after having been carefully examined, and the defective ones removed, they were conveyed to other machines (*vide* fig. 23), fixed upon the ground, by means of which they were finished ready for use. A large circular saw, the spindle of which could be raised or depressed by the action of a lever, had fixed in the centre of one of its sides two gouges, adapted to produce, by rapid revolution, a semicircular groove. A frame, the exact length of the gutters, was fixed at right angles to the plane of this saw. In the centre of this frame a species of chair was constructed, capable of turning round, and a shoe was fixed at the extremity of the frame farthest from the saw. The end of a gutter about 24 feet long was thrust into this shoe, and its middle supported by the chair already mentioned. The end nearest to the saw was then pressed down, and secured by an iron strap. Thus retained in position, it was necessarily bent to precisely that camber arranged to be ultimately given to it by suspension-rods and struts. The circular saw, revolving rapidly, was then made to descend until its edge came in contact with the end of the gutter, which it cut to the precise length required, and at exactly the right angle. The axis of the circular saw was then still further lowered down, until the gouges fixed on its side cut their way through the gutter, making a semicircular groove through its depth. One end being thus scooped out, the gutter was released from its position, turned round, and secured in a contrary direction in the shoe at the opposite extremity of the supporting frame. The other end of the gutter, thus presented in its turn to the saw, was then subjected to a similar process, after which it was removed, perfectly ready for the attachment of its iron bowstring.

Fig. 23.



he ridges.

A machine of somewhat similar construction (though much simpler) to that by which the Paxton gutters were made, brought the ridges to their proper form.

The sash-bars, Mr. Paxton's improvements in the manufacture of, generally.

In the course of numerous experiments which Mr. PAXTON had commenced as early as the year 1828, the great necessity for providing some machine by which a quantity of sash-bars might be speedily and economically cut, was forcibly impressed upon his mind. In the paper we have already quoted, Mr. PAXTON thus describes the origin of machines of this description:—"In 1837 the foundations "of the great conservatory (at Chatsworth) were commenced; and in constructing "so great a building, it was found desirable to contrive some means for abridging "the great amount of manual labour that would be required in making the "immense number of sash-bars requisite for the purpose. Accordingly, I visited "all the great workshops of London, Manchester, and Birmingham, to see if anything had been invented that would afford the facilities I required. The only "apparatus met with was a grooving-machine, which I had at once connected with "a steam-engine at Chatsworth, and which was subsequently so improved as to "make the sash-bar complete. For this apparatus the Society of Arts, in April, "1841, awarded me a medal, and this machine is the type from which all the "sash-bar machines found in use throughout the country to the present time are "taken. As the conservatory was erected under my own immediate superin-"te [illegible] k accurately as to the advantages of the machine. [illegible] done, saved in expenses 1,400*l.* The length of [illegible] 8 inches, only one inch shorter than those

" of the Exhibition Building. The machine was first used in its present form in " August, 1838, and its original cost, including table, wheels, and everything complete, was 20*l.* The motive power is from a steam-engine employed on the " premises for other purposes, and any well-seasoned timber may be used. The " attendants required are only a man and a boy, and the expense of the power " required for it when in use is comparatively trifling. The sash-bars may be " made of any form, by changing the character of the saws. There is one particular feature in working the machine, namely, that the bars are presented to " the saws below the centre of motion, instead of above it, as is usual; and to the " sides of the saw which are *ascending* from the table, instead of those which are " *descending*. These arrangements were necessary to suit the arrangement of the " teeth to the grain of the wood; for when the bars were presented to the saws " in the usual way, the wood was crushed, instead of being cut and cleaned. It is " essential that the machine should revolve 1,200 times in a minute to finish the " work in a proper manner."

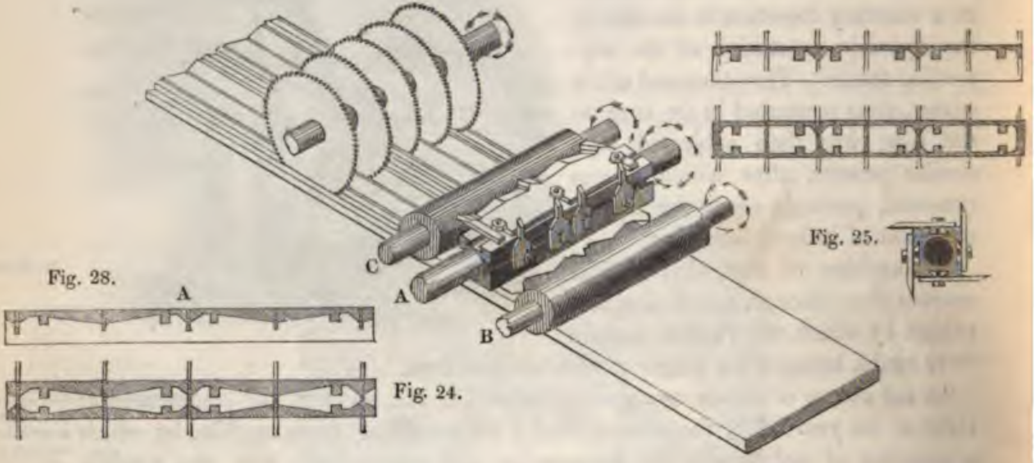


Fig. 26.

Fig. 27.

Fig. 25.

Fig. 28.

Fig. 24.

Sash-bar machine used for the building.

We shall now proceed to describe the modification of this machine, which is due to the inventive powers of Mr. BIRCH, of the Phœnix saw mills, near Cumberland-market, Regent's Park, with whom a contract was entered into by Messrs. FOX and HENDERSON for the supply of all the sash-bars for the roof, the upright bars for the vertical lights, and the ridges. Two of the principal points of difference between Mr. BIRCH's machine and that described by Mr. PAXTON are, that revolving cutters are substituted for saws, thus obviating difficulties incident to the grain of the wood; and that, by the addition of a second set of cutters, a plank passed between them is operated upon on its upper and under surfaces at the same time. In fig. 25 is shown a cast-iron block (somewhat similar to those previously described in connection with the gutter-cutting machine), to which are attached a variety of cutters. The rapid revolutions of the spindle (A fig. 26) operate upon the planks submitted to the action of the cutters, in the manner shown in fig. 28. So soon as the plank, presented by the feed-roller, has been operated upon by the rapid revolution of these miniature adzes, it is
on by the roller C, and is subjected to the action of circular saws
diameters, the lesser of which cut just sufficiently deep to form t

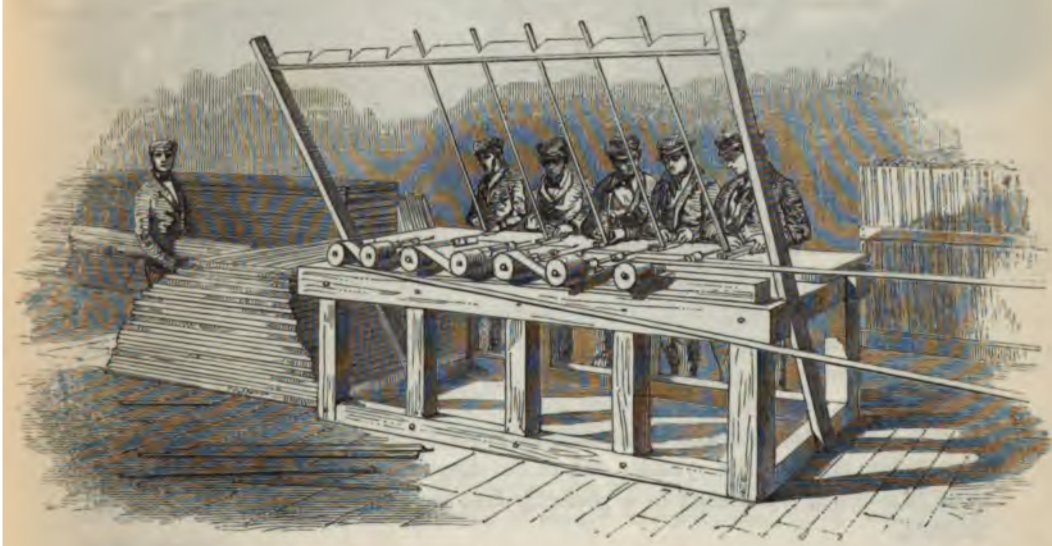
glass, while the larger pass completely through the plank, and divide it into four finished sash-bars. In figs. 24 and 28 is represented the mode in which the sash-bars for the vertical lights are made, the hatched lines indicating the parts removed; and in fig. 27, the way is shown in which the sash-bars for the roof have been cut. Modifications in the cutters affixed to the spindle A, fig. 26, produce the variation in form.

The sash-bars—how finished on the ground.

As delivered at the building, the sash-bars were cut approximately only to their length, and in order that it might not be necessary to execute any carpentering operation on the roof, it was requisite that they should be adjusted on the ground, ready for fixing. An arrangement of circular saws, set at the angles requisite to cut the ends of the sash-bars to accord with the pitch at which they would have to be presented for attachment to the ridges, served at once to cut a large number passed between them to a perfectly uniform length, and to form the necessary rebate for notching down upon the gutter edges.

To ensure the gimlet-holes necessary for nailing down the sash-bars being made with perfect regularity, a row of five gouges were set in motion by a band from an adjacent steam-engine, passing over a series of drums. The sash-bars, placed at a proper angle to them, were moved along by boys, in the manner shown in fig. 29, and presented to the points of the gouges, by the rapid revolution of which the necessary nail-holes were pierced.

Fig. 29.



The machine for painting the sash-bars.

It yet remained to paint these sash-bars, and even for that purpose the ingenuity of Messrs. Fox and Henderson provided mechanical assistance. A number of brushes were arranged in a frame, at right angles to one another, in such a manner that their bristles would just admit of the passage between them of a sash-bar. In a trough filled with colour a number of sash-bars were immersed, and one of them being lifted from it, loaded with colour, and presented to an aperture at one end of the series of brushes, it was passed through them to a corresponding aperture at the other end; by which process the whole of the superfluous paint was removed, and the sash-bar drawn out as neatly painted as it could have been by the workman's hand. This machine is represented in use in fig. 30.

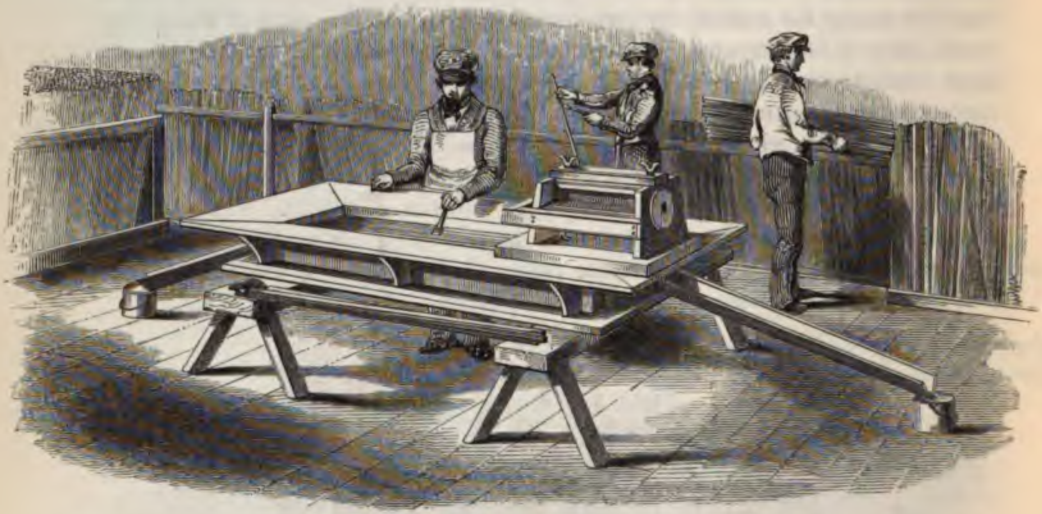
Morticing machine employed.

To facilitate the putting together of the sash-frames and sash-bars, considerable use was made of a machine for making mortices and tenons, patented by Messrs. FURNESS & Co., of Liverpool.

The making of the glass.

While these various machines were busily operating in the preparation of the necessary framework to receive the glass, Messrs. CHANCE BROTHERS & Co., of Smethwick, near Birmingham, to whom the contract for its supply had been committed, were not less actively employed. The large size of the sheets required (4 feet 1 inch by 10 inches), and the extraordinarily short time within which the immense quantity necessary had to be supplied, demanded the employment of numerous additional hands, and workmen had to be sought for from abroad to assist in the completion of the order within the requisite time. The mode of manufacturing the description of glass employed is a great improvement on the old system of crown-glass making; as by it the variation of the substance occasioned by the thickness of the glass, as it approaches the bull's-eye, is completely avoided. In the manufacture of sheet glass, the workman, having taken up a lump of glass on the end of his pipe, alternately blows, swings his ball of glass to and fro, and rolls it upon a metal table until it assumes the form of a long cylinder; the ends being then taken off, and the cylinder cut in the direction of its length, the sheet of glass falls down, is flattened to a perfectly true face, and is then trimmed off and finished.

Fig. 30.



Progress made in framing roof trusses;

During the preparation of the materials necessary to commence the construction of the Paxton roofing, active progress had been made in the framing of the wrought-iron trusses requisite to span the central 72-feet nave, and the 48-feet avenues on each side of it. A steam-engine of 6-horse power gave motion to drilling, punching, and cutting machines, represented in figs. 31 and 32. By means of these, the necessary pieces of bar-iron were adjusted to their requisite lengths. The holes for rivetting having been marked upon them with

by means of drilling, punching, and cutting, machines;

were punched out, and any larger perforations necessary for extr

drilled. The various parts, thus prepared for combination, were

upon platforms, and the holes in the various portions being ma

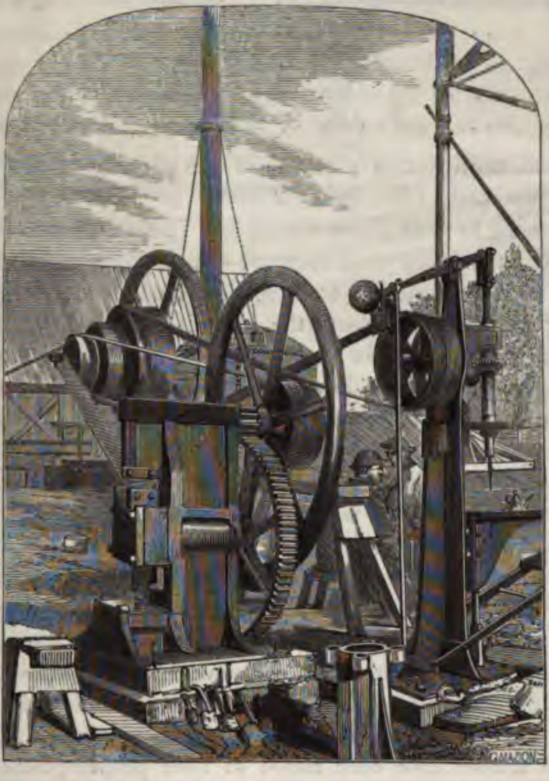
By rivetting up.

the operation of rivetting was gone through. A row of temporary forges was constructed by the side of the platforms, and the red-hot rivets taken from them were passed through the holes, and hammered by the workmen into their requisite forms.

The rate of delivery of columns, &c.

While these active preparations for the construction of the roofing were in progress, the daily supplies of castings of every description were of the most abundant nature; no less than 316 girders having been cast and supplied in one week. As fast as the columns came upon the ground, they were taken to their places and immediately fixed. Up to the 20th of September 77 columns had been supplied.

Figs. 31 and 32.



By the week ending the 25th of October, the average number fixed per week amounted to nearly 200, and that rate of supply was continued for several subsequent weeks.

The formation of the transept ribs.

The attention of the contractors was next directed to the formation of the transept ribs. The choicest timber was selected for that purpose, and under the careful superintendance of Mr. Fowler, their form was set out upon a platform erected for the purpose, and the timbers for the first rib laid down. When the rib thus commenced was completed, it was made to serve as a template for the [illegible] was fitted upon the others, until the pile [illegible] having been then laid down in other [illegible] hem in a similar manner.

The progress of carpenters' and joiners' work generally.

[illegible] ain structure advanced, it was [illegible] ashes, matched and beaded boarding, louvre frames, &c., for the external enclosures. The vertical sashbars, cut at the Phœnix saw-mills, were delivered by Mr. BIRCH in large quantities. Sash-frames, also cut at the same mills, were supplied, and these were fitted together by the contractor's carpenters, whose time and labour in forming mortices and tenons was much economised by the employment of the machine before alluded to, patented by Messrs. FURNESS & Co.

The increasing intensity of the work evidenced by—

As supplies of the smaller castings necessary to complete the various portions of the structure poured in, the work of erection and putting together proceeded with wonderful rapidity. The progressive increase in the number of hands employed affords a tolerable indication of the increasing intensity of the work:—

The number of hands employed.

1850.	In the week ending	Sept. 6,	39	men were employed.
	,,	Oct. 4,	419	,,
	,,	Nov. 1,	1,476	,,
	,,	Dec. 6,	2,260	,,
1851.	,,	Jan. 3,	2,112	,,

and from that time, until within a month of the opening of the Exhibition, the average number has rarely fallen below 2,000.

Raising of the 72 and 48-feet trusses;

The task of raising to their places the 48 and 72-feet trusses, was accomplished with great facility in the following manner:—A single mast was maintained in a vertical position by ropes, similar to those described as steadying the shear-legs used for hoisting the girders. From the summit of this mast descended other ropes, with blocks and pulleys, for the purpose of gaining power in lifting. What is called a leading or guide-block, having been attached to the bottom of the mast, a rope passing through it was connected with a yoke drawn by a horse. The mast having been placed close alongside the line in which the roof-trusses had to be fixed, and one end of a rope secured to the truss, the draught of the horse caused the truss to ascend to the necessary height, being steadied in its ascent by other ropes secured to its two ends.

Facilities for the above.

When the truss thus hoisted was fixed in its resting place, the mast was moved along a plank by means of crow-bars, being maintained in a perpendicular position by the alternate slackening and tightening of the cords extending from its head to stakes driven into the ground. Having thus been moved 24 feet, it was ready for the operation of a second hoisting. Two of these great masts, fixed on each side of the transept, were used daily, and in one day as many as seven of the great 72-feet trusses have been raised to their proper position and secured, the apparatus for elevating them having travelled in a vertical position no less than 168 feet.

The beginning of December the time of the climax of activity.

Towards the beginning of December the climax of activity was arrived at, and the most trying operation in the whole construction of the building commenced, namely, the hoisting of the main ribs for the great transept roof. The easiest and at the same time the most secure method of proceeding, with respect to the conduct of this operation, had for some time occupied the attention of the contractors. An ingenious suggestion, made to them by Mr. WILBEE, one of their foremen, was at once adopted, and, with certain modifications, it was promptly carried out.

Framing together of the transept ribs preparatory to raising.

The floor for the lead flat was already completed, so that an admirable stage was prepared upon which to make the necessary arrangements. The ends of the column into which it was designed to drop the ends of the ribs, rose about four feet above the level of the lead flat, and on the tops of those columns timbers were laid, forming landing stages or tram-ways, to receive the ribs when hoisted. It was of course necessary to raise the ribs sufficiently high above the lead flat to enable their ends to descend upon the tram-ways. To effect this it was determined that two ribs should be placed on end, at a distance of 24 feet from each other, and framed together with purlins and diagonal ties, exactly as they would have to be framed in their finished state. Two complete sets of additional temporary ties were further introduced, to provide for the strain to which the ribs would necessarily be exposed from their altered position in the act of hoisting. The feet of the ribs were securely attached to stout pieces of timber, to afford the means of safely attaching the cords by which they were to be raised. Thus framed together, the ribs were moved on rollers to the centre of the square formed by the intersection of the nave and transept.

Provisions for raising.

On the extra strong trusses which have been described as spanning the nave at this point, two pairs of shear-legs were fixed at 24 feet from one another, and secured by ropes connecting them with distant portions of the building. These hoisting shears consisted of two legs on each side of the transept, each leg being formed of three stout scaffold poles lashed together at the top, and footed on planks laid across the lead flat. The heads of these shear-legs inclining slightly forwards, had connected with them blocks and pulleys from which descended ropes, attached to the four ends of the two ribs. The hoisting ropes connected with the sets of pulleys passed down from the shears to leading blocks, attached to the four columns at the angles of the intersection of the nave and transept. From these guide blocks they were led off diagonally to four powerful crabs, so arranged that the gangs of men employed at each were placed opposite the end of the rib acted upon by the crab they worked; and thus the foreman of each gang was enabled so to regulate the exertions of his men as to make them correspond with those of the remaining gangs, and to maintain the two ends on each side in a perfectly horizontal plane.

Raising.

As the diameter of the semicircular ribs exceeded the width of the transept by their own thickness, it became necessary, in order that they might pass between the trusses, to commence by raising two of their ends to a considerable height from the ground; and to maintain their diameter at the same angle of inclination until they were hoisted above the columns into which they had to drop. On raising them to a height of about 65 feet from the ground, the highest ends were drawn in a horizontal direction, so as to hang over a portion of the lead flats, and thus room was left to allow the other ends to be lifted to a corresponding height on the opposite side. The ribs were shifted slightly in a horizontal direction until the ends came over the columns, they were then lowered down upon rollers placed upon the tram-ways above mentioned, and by means of these rollers the ribs were moved along to the furthest end of the transept. The place in the centre of the building occupied by the ribs thus hoisted was immediately taken by another pair, which were similarly connected, raised, and mo [illegible] in 24 feet of the first pair.

When the whole of the ribs were thus elevated to their [illegible] between them were filled up with the necessary intermediate [illegible] and thus the whole roof was framed together complet [illegible]

The raising of the main ribs commenced on [illegible] whole sixteen were fixed in one week. It occ [illegible] of ribs from the ground to the level of the lead flat, but the previous preparations involved a much longer space of time. Eleven men worked at each crab, and about 16 were employed on the lead flat, to guide the ribs in their ascent, and see to the safe condition of the shear-legs and tackle. Considering the anxious nature of this performance, it must be regarded as a most gratifying circumstance, that the whole operation was accomplished without any untoward occurrence.

and number of men required.

Glazing the transept roof.

No sooner had the skeleton of the transept-roof been completed, than the work of glazing commenced. For a considerable portion of the height of the curve, ladders and temporary scaffolds enabled the workmen to proceed with their labours; but in order to complete the upper part an ingenious box was constructed, moving on wheels in the line of the gutters. This box was lowered down from the lead-flat at the summit to any portion of the roof.

Glazing the nave roof.

The glazing of the nave roof presented formidable difficulties, from the great extent of work to be got through in so short a space of time. The ingenuity of the contractors was, however, brought to bear upon the subject, and provisions were made by them for the simultaneous glazing of large areas, entirely independent of variations of weather. 76 machines were constructed, each capable of accommodating two glaziers; these machines consisted of a stage of deal about 8 feet square, with an opening in its centre sufficiently large to admit of boxes of glass, and supplies of sash-bars, putty, &c., being hoisted through it. The stage rested on four small wheels, travelling in the Paxton gutters, and spanned a width consisting of one ridge and two sloping sides. In bad weather the workmen were covered by an awning of canvas, stretched over hoops for their protection.

Construction of glazing-machines;

How used.

In working, the men sat at the end of the platform next to whatever work had been last done; from which they pushed the stage backward sufficiently far to allow them to insert a pane of glass, and as soon as that was completed they moved again far enough to allow of the insertion of another. In this manner each stage travelled uninterruptedly from the transept to the east and west ends of the building. The dexterity acquired by the men in working the machines was very remarkable. By means of them 80 men in one week put in upwards of 18,000 panes of glass, being not less than 62,600 feet superficial. The greatest number of panes inserted by a man in one day was 108, being 367 feet 6 inches of glazing. A somewhat similar machine has been constructed for the purpose of effecting any repairs that may be necessary in the finished roof, with the difference that its wheels travel upon the ridges instead of in the gutters, and that of course there is no aperture for the purpose of hoisting.

Quantity of work done.

Rapid supply of small castings.

Taking into account the innumerable quantity of small castings requisite, and the extreme rapidity with which they had to be supplied, their quality and cleanness is truly remarkable; and the fact of their having all issued from one foundry, that of the contractors at Smethwick, proves the great facility with which work of that nature can be executed in England.

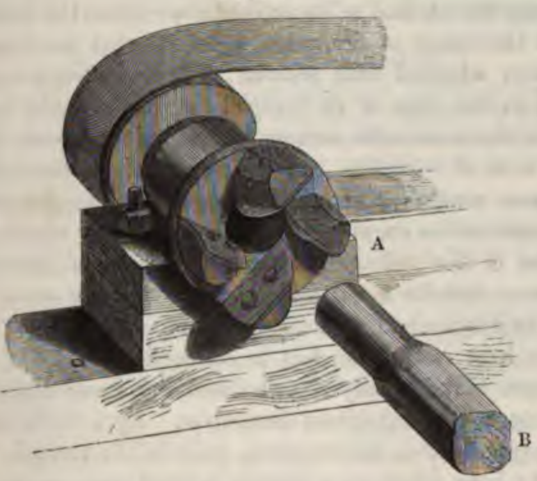
Celerity with which the painting of the nave roof was executed.

Among the later operations connected with the completion of the work, the most remarkable for the celerity with which it was conducted, was the ornamental painting of the nave roof. Iron straps, attached to the trusses, supported a number of scaffold poles, on which a perfect cloud of boards was laid, and as many as between 400 and 500 painters, by these means, worked their way, with extreme rapidity, from one end of the building to the other.

The application of machinery to make the gallery hand-rails.

The magnitude of this great building elevated into serious undertakings matters which, under ordinary circumstances, are accounted little more than trifles. Hence machinery was applied to the formation of the entire length of hand-rail required for the galleries. In fig. 33 is represented a set of cutters (A fig. 33), by exposure to the rapid revolution of which, roughly-shaped strips of mahogany were instantaneously converted into smooth and cleanly rounded hand-rails (B fig. 33). A little sand-paper and French-polish sufficed to bring them to their present excellent condition.

Fig. 33.



Paucity of accidents.

In summing up the description of any great engineering undertaking, it is too often a painful task to have to record the loss of life so frequently involved. Considering the difficulties of construction, the necessary perils to which the workmen were exposed, and their habitual imprudence, arising, partly, from real indifference to danger, and partly from bravado, it has been a source of congratulation that, in the performance of this contract, but very few accidents have occurred, and those, with two or three exceptions, of a slight nature.

Conclusion.

Having now brought to a close our description of the building as it exists, and of the processes by which its existence has been developed, it remains only to reiterate our conviction that the courage, energy, and strength represented by its construction should be regarded by every Englishman with emotions conducive to some yet higher manifestation of national capability; and at the same time to express a hope that the products of British industry (of which the building is but the shrine), may display, in a yet higher degree and in a yet more tangible and varied form, the sources of COMMERCIAL POWER, so many indications of which it has been our happy privilege to trace in the edifice itself.

M. DIGBY WYATT.

SCIENTIFIC REVISION AND PREPARATION OF THE CATALOGUE.

Peculiar circumstances of production of Catalogue.

THE circumstances under which this work is published appear to call for some observations upon the method of its production. From the fact that it is without a precedent in the annals of literature, it follows that its preparation and publication have been attended with peculiar, because unforeseen, difficulties. All those obstacles in the way of its completion which would necessarily develop themselves from the remarkable manner in which its contents have been created, and from the want of a guiding experience in the publication of works of this nature, have been contended with in its progress to a perfect state. The following may be considered as an outline of the manner in which the materials for the construction of this volume were collected, and of the system adopted to reduce them to a definite form, and as far as possible to a certain degree of consistency of expression and of harmony of proportion.

Exhibitors the authors.

It is not the least remarkable fact in connection with the Great Exhibition, that the Catalogue may be really regarded as the production of many thousands of authors,—represented by exhibitors themselves. By a decision of the Executive Committee, every exhibitor was required, prior to the reception of his articles at the Building, to have filled up a certain printed form, containing a description of his productions in the English language, accompanied with such general observations as might be suggested by the peculiar character of the things described and intended for exhibition. These forms, which were to be to the Catalogue what the MS. of an author is to his proposed work, were framed with care, and were accompanied with instructions for filling them up, which suggested those points on which interesting or important information might be supplied, together with the descriptive account. There were four varieties, each appropriated to one of the four great sections of Raw Materials, Machinery, Manufactures, and Fine Arts. The essential characters of these forms were similar in each section, but the instructions for filling them up differed necessarily with the peculiar differences suggested by each section. The subjoined form represents that used in sending in descriptions of machinery, and is a type of those used in the other sections:—

Catalogue form.

List of Articles of MACHINERY *to be exhibited by*

_______________Exhibitor's Surname. _______________ Christian Name.

_______________Country. _______________Address, stating nearest Post Town.

_______________Capacity in which the Exhibitor appears, whether as *Producer*, *Importer*, *Manufacturer*, *Designer*, *Inventor*, or *Proprietor*.

No. of Articles.	DESCRIPTIONS.

Classification of the forms.

In order to facilitate their classification on being returned by exhibitors, the forms in the four different sections were printed in black, blue, red, and yellow, the latter applying to sculpture and fine art, the former to raw materials, and the intermediate ones respectively to machinery and manufactures. Every exhibitor was required to send in one of these forms, accompanied with a duplicate in every respect similar to it, and in so doing was supplied with a "receipt for catalogue forms," which was a guarantee for the reception of his goods into the Building. A very large number of these forms were printed and supplied to Local Committees, and to all exhibitors who applied for them. The instructions for filling them up were as follows:—

RULES FOR COMPILING THE CATALOGUE.

The Executive Committee are desirous of impressing upon Exhibitors that the formation of the Catalogue which, however great may be its bulk, must necessarily be compiled and printed in a very short time, will be much facilitated, if Exhibitors will have the kindness to follow the rules hereinafter prescribed when they furnish the descriptions of the Articles as they wish them to appear in the Catalogue.

Rules for compiling forms for Catalogues,

1. Every Exhibitor should write the description of every Article or series of Articles he exhibits, on paper of the same size as the present page (namely, about 13 inches by 8 inches). The paper must be written *on one side only*. There should be a margin of one inch at the left side of the page.

2. Should the description extend beyond a single page, each separate page must be marked with the Exhibitor's name, and numbered consecutively, both at the head and foot.

3. To prevent errors in compilation and misprinting, it is desirable the handwriting should be *very clear*, especial care being taken with all names and technical terms.

4. It is indispensable that each Exhibitor should furnish the following particulars, and in the exact order prescribed:—

I. . . . . Exhibitor's surname . . . . Christian name.
II. . . . . Country . . . . Address, stating the nearest Post Town.
III. . . . . Capacity in which the Exhibitor appears, whether as Producer, Importer, Manufacturer, Designer, Inventor, or Proprietor.
IV. The name and description of every Article of importance or class of Articles exhibited; each Article or Class beginning a separate paragraph, *e. g.*—

a Specimens of dyed Cottons, &c.
b Specimens of dyed Silks, &c.

5. It is necessary that the descriptions of the Articles should set forth, as far as may be practicable, the following particulars:—

As respects Articles to be exhibited

In SECTION 1. RAW MATERIALS and PROCESSES, the descriptions should specify—

- *a* The commercial name in English, French, and German.
- *b* The scientific name.
- *c* The place where obtained; the name of the mines and period they have been worked, should be given with minerals.
- *d* The place where exported.
- *e* The uses.
- *f* The consumption.
- *g* The superior excellence of the particular Specimens.
- *h* In the case of processes, such as dyes, or prepared materials, such as mixed metals; it should be stated whether the Article is patented or not. The novelty and importance of the prepared product, and the superior skill and ingenuity manifested in the process of preparation should also be very briefly pointed out.
- *i* Where price is an element for consideration, the price at which the importer or producer can sell the Article.
- *j* Any particular features which the Exhibitor desires to be noticed by the Jury.

Raw Materials and Machinery.

In SECTION 2. MACHINERY, the descriptions should specify—

- *a* The uses.
- *b* The novelty, if any, in the invention.
- *c* Superiority of execution.
- *d* Increased efficiency or economy.
- *e* The importance of the Article in a social or other point of view.
- *f* The place where produced.
- *g* Whether the Article is patented or not.
- *h* Where price is an element for consideration, the price at which the producer can sell the Article.
- *i* Any particular features which the Exhibitor desires to be noticed by the Jury.

Manufactures.

In SECTION 3. MANUFACTURES, the descriptions should specify—

- *a* The uses.
- *b* The novelty.
- *c* Superiority of execution.
- *d* Improved forms or arrangements.
- *e* Increased efficiency or economy.
- *f* New use of known Materials.
- *g* Use of new Materials.
- *h* New combinations of Materials.
- *i* Importance of the Article in a social or other point of view.

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CLASSIFICATION OF SUBJECTS IN THE THIRTY CLASSES INTO WHICH THE EXHIBITION IS DIVIDED.

Class.

RAW MATERIALS.

I. Mining, Quarrying, Metallurgical Operations, and Mineral Products.
II. Chemical and Pharmaceutical Processes and Products generally.
III. Substances used for Food.
IV. Vegetable and Animal Substances, chiefly used in Manufactures, as Implements, or for Ornament.

MACHINERY.

V. Machines for direct use, including Carriages and Railway and Naval Mechanism.
VI. Manufacturing Machines and Tools.
VII. Civil Engineering, Architectural, and Building Contrivances.
VIII. Naval Architecture and Military Engineering; Ordnance, Armour, and Accoutrements.
IX. Agricultural and Horticultural Machines and Implements.
X. Philosophical Instruments and Processes depending upon their use; Musical, Horological, and Surgical Instruments.

MANUFACTURES.

XI. Cotton.
XII. Woollen and Worsted.
XIII. Silk and Velvet.
XIV. Manufactures from Flax and Hemp.
XV. Mixed Fabrics, including Shawls, but exclusive of Worsted Goods (Class XII.).
XVI. Leather, including Saddlery and Harness, Skins, Fur, Feathers, and Hair.
XVII. Paper and Stationery, Printing and Bookbinding.
XVIII. Woven, Spun, Felted, and laid Fabrics, when shown as specimens of Printing or Dyeing.
XIX. Tapestry, including Carpets and Floor-cloths, Lace and Embroidery, Fancy and Industrial Works.
XX. Articles of Clothing for immediate personal or domestic use.
XXI. Cutlery and Edge Tools.
XXII. Iron and General Hardware.
XXIII. Working in precious Metals, and in their imitation, Jewellery, and all articles of Virtu and Luxury, not included in all other Classes.
XXIV. Glass.
XXV. Ceramic Manufactures, China, Porcelain, Earthenware, &c.
XXVI. Decoration Furniture and Upholstery, including Paper-hangings, Papier Maché, and Japanned Goods.
XXVII. Manufactures in Mineral Substances, used for building or decoration, as in Marble, Slate, Porphyries, Cements, Artificial Stones, &c.
XXVIII. Manufactures from Animal and Vegetable Substances, not being Woven or Felted, or included in other Sections.
XXIX. Miscellaneous Manufactures and Small Wares.

FINE ARTS.

XXX. Sculpture, Models, and Plastic Art.

I. *Mining, Quarrying, Metallurgical Operations, and Mineral Products.*

A. MINING AND QUARRYING OPERATIONS.

1. Quarries and open workings.
2. Streaming; washing alluvial deposits.
3. Mines worked on the lode.
    - *a.* Sinking of shafts.
    - *b.* Cutting adits.
    - *c.* Driving levels.
4. Mines worked on the bed.
    - *a.* Sinking shafts.
    - *b.* Driving levels.
    - *c.* Cutting stalls or headings.
5. Salt deposits.
6. Ventilation; Safety Lamps, and other modes of Lighting.
7. Methods of raising Men, Ore, and Water.
    - *a.* Raising Ore.
    - *b.* Lowering and raising Miners.
    - *c.* Draining.

B. GEOLOGICAL MAPS, PLANS, AND SECTIONS.

C. ORES AND METALLURGICAL OPERATIONS.

1. Ores and the Methods of dressing and rendering Ores merchantable.
    - *a.* Ores of the more common Metals, as of Iron, Copper, Zinc, Tin, Lead.
    - *b.* Native Metals, as Gold, Silver, Copper, &c.
    - *c.* Ores used for various purposes, without reduction, as Peroxide of Manganese, &c.
2. Methods of roasting, smelting, or otherwise reducing Ores.
    - *a.* The common Metals, as Iron, Copper, Zinc, Tin, Lead.
    - *b.* The Metals more generally used in combination, as Antimony, Arsenic, Bismuth, Cadmium, Cobalt, Nickel, &c.
3. Methods of preparing for use the nobler Metals, as Gold, Silver, Mercury, Palladium, Platinum, &c.
4. Adaptation of Metals to special purposes.
    - *a.* Metals in various Chemical states, as Iron in the condition of Cast and Malleable Iron, Steel, &c.
    - *b.* Metals in their progress to finished Manufactures, as Pigs and Ingots, Sheets, Bars, Wires, &c.
5. Alloys, and methods of rendering more generally useful Metals and their alloys—
    - *a.* Statuary, Bronze, Gun, Bell, and Speculum Metals.
    - *b.* Brass, and alloys used as a substitute for it.
    - *c.* White alloys, as Britannia Metal, German Silver, Pewter, &c.
    - *d.* Type, Sheathing Metals, and other alloys.

D. NON-METALLIC MINERAL PRODUCTS.

1. Minerals used as Fuel—
    - *a.* All kinds of Coal and derived products.
    - *b.* Lignite and Peat ,, ,,
    - *c.* Bituminous bodies and native Naphtha.
2. Massive Minerals used in construction.
    - *a.* For purposes of construction generally—
        - Siliceous or Calcareous Free Stones and Flags.
        - Granites, porphyritic and basaltic Rocks.
        - Slates.
    - *b.* For purposes of Ornament, Decoration, and the Fine Arts—
        - Marbles.
        - Alabaster, Spar, &c.
        - Serpentine and other hard rocks susceptible of high polish.
    - *c.* Cements and Artificial Stones—
        - Calcareous and Hydraulic Cements.
        - Puzzuolanas, Trass, &c.
        - Gypsum for plaster.
        - Artificial Stones.
3. Minerals used in the manufacture of Pottery and Glass—
    - Sands, Limestones, &c., for Glass-making.
    - Various Clays and felspathic Minerals, as those used for Bricks, Tiles, and various kinds of Pottery and Porcelain.
    - Siliceous, Calcareous, and other Minerals, used in Plastic Arts.
4. Minerals used for personal Ornaments, or for Mechanical and Scientific purposes.
    - *a.* Gems and Precious Stones.
    - *b.* Models of Minerals and Crystals, &c.
    - *c.* Collections of Minerals for scientific or educational use.
5. Minerals used in various Arts and Manufactures.
    - *a.* Simple bodies or compounds containing the Alkalis or Alkaline Earths—
        - Those used principally for culinary purposes or for Medicine, as Salt, Mineral Waters, &c.
        - Those used in various manufactures, as Sulphur, Borax, &c.
    - *b.* Earthy and semi-crystalline Minerals.
        - Minerals used for grinding and polishing, as Grindstones, Honestones, Emery, &c.
        - Lithographic Stones, Drawing Chalks, and Slate Pencils.
        - Graphite.
        - Earthy and other Minerals used as pigments, or for staining, dyeing, and colouring.
        - Various Minerals used in Manufactures; as Alum Schist, Fuller's Earth, French Chalk, Casting Sands, &c.
6. Soils and Mineral Manures.

II. *Chemical and Pharmaceutical Processes and Products generally.*

A. CHEMICAL SUBSTANCES USED IN MANUFACTURE.

1. From the Mineral Kingdom.
    - *a.* Non-metallic substances.
        - Those used principally in their elementary state, as Sulphur, Phosphorus, &c.
        - Acids, as Sulphuric, Muriatic, Nitric, Boracic, &c.
        - Miscellaneous Manufactures, as Sulphuret of Carbon, Chloride of Sulphur, &c.
    - *b.* Alkalies, Earths, and their compounds.
        - Alkalies and their Alkaline Salts, as Soda, Potash, Ammonia, and the Carbonates, &c.
        - Neutral Salts of the Alkalies, as Sulphate, Nitrate of Soda, Saltpetre, Borax, &c.
        - Earths and their compounds, as Lime, Magnesia, Barytes, Strontia, Alumina, &c.
    - *c.* The compounds of Metals proper, as Salts of Iron, Copper, Lead, &c.
    - *d.* Mixed Chemical Manufactures, as Prussiate of Potash, &c.
2. From the Organic Kingdom, and not included in Sections III. and IV.
3. Manufactured Pigments, Dyes, and miscellaneous Chemical Manufactures. (See also Section IV.)
    - *a.* Pigments employed in House Decoration, and for colouring Woods.
    - *b.* Pigments used for Textile Fabrics.
    - *c.* Pigments used for Paper Hangings, and for felted and laid Fabrics generally.
    - *d.* Artists' Colours.
    - *e.* Miscellaneous Chemical Manufactures.

B. RARER CHEMICAL SUBSTANCES, MANUFACTURED CHIEFLY FOR THE USE OF THE SCIENTIFIC CHEMIST.

1. From Substances of the Mineral Kingdom.
2. ,, Vegetable ,,
3. ,, Animal ,,

C. CHEMICAL SUBSTANCES USED IN MEDICINE AND IN PHARMACY.

1. From the Mineral Kingdom.
    - *a.* Non-metallic substances and their compounds.
    - *b.* Alkalies, Earths, and their compounds.
    - *c.* Metallic Preparations.
2. From the Vegetable Kingdom, when shown for Pharmaceutical purposes. (See also Sections III. and IV.)
    - *a.* Vegetable Infusions, Decoctions, and Solutions, clear or saccharine.
    - *b.* Tinctures.
    - *c.* Extracts and Inspissated Juices.
    - *d.* Resins, Gum Resins, and Oleo Resins and Balsams.
    - *e.* Aloes, &c.
    - *f.* Gums as Acacia, Tragacanth, &c.
    - *g.* Essential Oils, Cajeput, Savine, Turpentine, &c.
    - *h.* Fixed Oils, as Castor, Croton, Almond, Olive, &c.
    - *i.* Vegetable parts, as leaves of Digitalis, Hemlock, roots of Jalap, Ipecacuanha, &c.
    - *j.* Barks as imported, Cinchona, Cascarilla, Cusparia, &c.

    - *k.* Vegeto-Alkalies, their Salts and other Crystalline principles of medicinal substances.
    - *l.* Vegetable Acids.
    - *m.* Miscellaneous Compounds.
- 3. From the Animal Kingdom.
    - *a.* Cod-liver and other Animal Oils for internal or external application.
    - *b.* Unguents of Spermaceti, Lard, Oil, and combinations of them.
    - *c.* Antispasmodics, as Musk, Castoreum, Civet, Ambergris, &c.
    - *d.* Phosphorus, Ammonia, and their products.
    - *e.* Irritants, as Cantharides.
    - *f.* Antacids, as Crabs'-eyes, Calcareous concretions of the Craw-fish, Cuttle-bone, &c.

III. *Substances used as Food.*

VEGETABLE KINGDOM.

A. Agricultural Produce—Cereals, Pulses, Oil, Seeds, etc.

1. Common European Cereals.
2. Cereals more rarely cultivated in Europe.
3. Millet and other small Grains used as food.
4. Pulses and Cattle Food.
5. Grasses, Fodder Plants, and Agricultural Roots.
6. The Flours or preparations of the above classes.
7. Oil Seeds and their Cakes.
8. Hops and other aromatic plants used for like purposes.

B. Dried Fruit and Seeds.

1. Raisins, Currants, Figs, Plums, Cherries, Apricots, &c.
2. Dates, Tamarinds, Dried Bananas, &c.
3. Almonds, Chesnuts, Walnuts, &c.
4. Cocoa-nuts, &c.

C. Substances used in the preparation of Drinks.

1. Real Teas of all kinds.
2. Substitute for Teas, as Paraguay, Arabian, Bencoolin, &c.
3. Coffee of all kinds, and Cocoa Seeds and Nibs.
4. Various substances, as Chicory Roots, Amande de Terre, Guarana Bread, &c.

D. Intoxicating Drugs, Fermented Liquors, and Distilled Spirits from unusual Sources.

1. Fermented Liquors and Spirits from unusual sources.
2. Tobacco.
3. Opium.
4. Hemp, and other Intoxicating Drugs.

E. Spices and Condiments.

1. Cinnamon, Cassia, and their substitutes.
2. Nutmegs and Mace; Cloves and Cassia Buds.
3. Peppers, Capsicum, Mustard, Vanilla, Pimento, Cardamums, &c.
4. Ginger, Turmeric, &c.

F. Starch Series.

1. Starches of all kinds prepared from Wheat, Rice, Potatoes, Maize, &c.
2. Arrowroots of all kinds, Tous les Mois.
3. Sagos from the Palms, Cassava, Tapioca, &c.
4. Lichens of all kinds.
5. Other Starchy Substances, as Portland Sago from *Arum Maculatum*, and from various like plants.

G. Sugar Series.

1. Sugars from the Cane and Beet.
   ,, Maple and Palms.
   ,, Birch, Poplar, Oak, and Ash.
   Grape Sugar.
2. Liquorice, Sarcocoll, &c.

ANIMAL KINGDOM.

H. Animal Food and Preparations of Food as Industrial Products.

1. Specimens of preserved Meats.
2. Portable Soups, and concentrated nutriment, as consolidated Milk, &c.
3. Caviare, Trepang, &c.
4. Articles of Eastern commerce, as Shark Fins, Nest of the Java Swallow, &c.
5. Honey and its preparations.
6. Blood and its preparations.
7. Industrial Products, as Glue, Gelatine, Isinglass, Gluten, &c.

IV. *Vegetable and Animal Substances, chiefly used in Manufactures, as Implements, or for Ornaments.*

VEGETABLE.

A. Gum and Resin Series.

1. Gums of all kinds of natural occurrence—
   Gums made artificially, as British Gum.
   Mucilaginous Seeds, Barks, Pods, and Seaweeds.
2. Resins—
   Resins and Balsams of all kinds.
   Gum Resins.
   Gum Elastics and Gutta Percha.
   Distilled Resins and Varnishes.

B. Oil Series.

1. Volatile Oils, including Camphor.
2. Drying Fat Oils.
3. Non-drying Fat Oils.
4. Solid Oils.
5. Wax.
6. Distilled Fat Oils.

C. Acids, as Acetic, Citric, Tartaric, Oxalic, &c.

D. Dyes and Colours.

1. Indigos.
2. Madders.
3. Lichens and their preparations.
4. Dyeing Barks, as Acacias, Quercitron, Mangrove, &c.
5. Woods, as Logwood, Brazil wood, Peach wood, Fustics, &c.
6. Flowers and Berries, as Persian Berries, Safflower, Saffron.
7. Miscellaneous, as Turmeric, &c.

E. Tanning Substances.

1. Pods, Berries, Seeds, and Fruits of various kinds, as *Algaroab*, *Acacia*, Nib-nib and Divi-divi Pods, &c.
2. Barks of various kinds, as Barks of the Babool, Brazilian Acacias, Murici, Bucida, Gordonia.
3. Galls, and similar Tanning Materials.
4. Catechu, Kino, Gambeer, &c.

F. Fibrous Substances, including Materials for Cordage and Clothing.

1. Cottons of all kinds.
2. Hemp and Flax; Manilla Hemp and New Zealand Flax.
3. China Grass, Nettle Fibre, Plantain, and Pine Apple Fibre.
4. Sunn, Jute, and other tropical substitutes for Hemp, Flax.
5. Coir, or Cocoa-Nut Fibre, Gomuti, &c.
6. Rushes and Miscellaneous Substances.

G. Cellular Substances.

1. Corks of all kinds.
2. Woods and Roots used for Corks, as the *Ochroma lagopus* and *Anona palustris*
3. Rice-paper of China.
4. Birch Bark, Pottery Bark, Citrus Rind, &c.
5. Substances used as Amadou.

H. Timber and Fancy Woods used for Construction and Ornament, and prepared by Dyeing.

1. Suited chiefly for purposes of construction, or for the Navy.
2. Suited chiefly for Ornamental Work.
3. Prepared Woods, as by Kyan's, Payne's, Bethell's, and Boucherie's processes.

I. Miscellaneous Substances.

1. Substances used as Soap, as Quillai Bark, Soap Berries (*Sapindus saponaria*), Soap Roots (*Saponaria officinalis, &c.*).
2. Perfumes, as Pucha Pat, Vetiver, Spikenard, Tonka beans, &c.
3. Substances used mechanically, as Teazels, Dutch Rushes, &c.
4. Seeds and fruits used for Ornamental purposes, as Ganitrus Beads, the Ivory Nut, the Doom Palm, Coquilla Nuts, Bottle Gourds, &c.

ANIMAL.

J. For Textile Fabrics and Clothing.

1. Wool, Hair, Bristles, Whalebones.
2. Silk from the Silk-worm *Bombyx Mori*, and from other species in India, *e. g.* *Bombycilla Cynthia* and *Attacus Paphia*.
3. Feather, Down, Fur, Skins.
4. Miscellaneous.

K. For Domestic or Ornamental Purposes, or for the Manufacture of Implements.

1. Bone, Horn, Hoofs, Ivory, Tortoiseshell, Shagreen, Quills.
2. Pearls, Seed Pearl, Mother-of-pearl, Coral, and Shells generally.
3. Oils, Tallows, Spermaceti, Wax, Lard.
4. Miscellaneous, as Sponge, Goldbeater's-skin, Catgut, Silkworm-gut, Bladders, &c.

L. As Agents in the Manufacture of various Articles.

1. Glue, Isinglass, Gelatine, Bone-black, Ivory-black, Animal Charcoal.

M. For the Production of Chemical Substances.

Blood, Bones, Horns, &c., for the production of Phosphorus, the Prussiates, the Superphosphates, &c.

N. For Pigments and Dyes.

1. Cochineal and Carmine.
2. Dyes from the Galls of the Aphides.
3. Gall-stone, pigment from Ox-gall.
4. Indian dyes from the Coccus, the various kinds of Lacs.
5. Miscellaneous, as Sepia, Enena d'Orient, &c.

MACHINERY.

V. *Machines for direct use, including Carriages and Railway and Naval Mechanism.*

A. Steam Engines and Boilers, Water and Wind Mills, and various other Prime Movers.

1. Boilers.
2. Land Engines.
3. Marine Engines.
4. Windmills.
5. Water-wheels and Tourbines.
6. Water-pressure Engines, as Richenback's and Armstrong's.
7. Vacuum Power Engines.
8. Electro-Magnetic Engines, &c.
9. Miscellaneous.

B. Separate parts of Machines, Specimens of Workmanship. (See also Water and Gas Works in VII.)

1. As heavy Castings or Forgings in the rough; Castings or Forgings, plain, intricate, or beautiful, in the Rough.
2. Specimens of Turning in Metals.
3. Specimens in filing and finished Work in Metals, such as Surfaces, Irregular Figures, &c.
4. Valves, Cocks, Pistons, Governors, &c.

C. Pneumatic Machines.

1. Air Pumps.
2. Blowing Fans.
3. Blast Engines for Furnaces, &c.
4. Miscellaneous.

D. Hydraulic Machines, Cranes, etc., Pile Drivers, etc. (See also VII.)

1. Hydraulic Machines—
   Pumps and Fire Engines.
   Water Rams.
   Hydraulic Presses, &c.
   Water-meters, &c.
2. Cranes—
   Any sort of Crane motion and contrivances, Jacks of all sorts. (For Windlasses, Capstans, and Blocks, see VIII. E.)
3. Piling Engines.—(See also VII. A.)
   By hand power, or steam.
   Pile Sawing Machines.
   Pile Extractors, &c.

E. Locomotives and Railway Carriages, &c.

1. Railway Locomotives.
2. Common Road Locomotives.
3. Railway Carriages, Trucks, and Waggons.
4. Railway Velocipedes, &c. &c., of all sorts.
5. Atmospheric Railway Apparatus.
6. Carriage Breaks.
7. Buffers, Couplings, &c.

F. Railway Machinery and Permanent Way.

1. Permanent Way complete.
2. Sleepers.
3. Chairs, &c.
4. Rails.
5. Switches.
6. Turntables.
7. Station Arrangements.
8. Signals.
9. Miscellaneous.

G. Weighing, Measuring, and Registering Machines for Commercial and not for Philosophical Purposes.

1. Commercial Weighing Instruments.
2. Instruments of Measure.
3. Registering Instruments, Gauges, Indicators, and Telltales.

V. *a. Carriages generally—not including those connected with Rail or Tram Roads.*

A. For Town Use.

Dress Vis-à-Vis.
Dress Coach.
Dress Chariot.
Landau.
Landaulet.
Step-piece Landau.
Barouche.
Sociable.

B. Travelling Carriages.

Coach.
Driving Coach.
Chariot.
Britska Chariot.
Dormeuse Post Chariot
Post Chariot.
Britska.
Droitska.
Fourgon.
Invalid Carriage.
Sledges, &c.

C. For General Use.

Basterna.
Brougham.
Double Brougham.
Clarence.
Pilentum.
Cariole.
Domestic.
Driving Phaeton.
Mail Phaeton.
Cabriolet Phaeton.
Park Phaeton.
Pony Phaeton.
Curricle.
Cabriolet.
Headed Chaise.
Tilbury.
Stanhope.
Dennett.
Gig.
Irish Car.
Dog Cart.
Pony Chaise.
Invalid Bath Chair.
Velocipedes.

D. Public Carriages.

Mail Coach.
Stage Coach.
Omnibus.
Hackney Coach.
Hackney Chariot.
Glass Coach.
Hansom's Cab.
Street Cab.
Fly.
Hearse.
Caravan.

E. Carts and Waggons of all Kinds, not being Agricultural.

VI. *Manufacturing Machines and Tools, or Systems of Machinery, Tools, and Implements employed for the undermentioned purposes.*

A. Manufactures of all Spun, Woven, Felted, or Laid Fabrics.

1. Machinery for the complete formation from the Raw Material of all Fabrics of Cotton, Wool, Flax, Hemp, Silk, Caoutchouc, Gutta Percha, Hair.
2. Paper-making and Staining.
3. Printing and Bookbinding.

B. Manufactures of Metals.

1. The manufacture of Metals from the Ore into Bars, Rods, Wire, Sheets, and other general forms; also casting and polishing of Metal, &c.
2. The cutting and working of Metals by Machine Tools, such as Lathes; Machines for Planing, Drilling, Boring, Slotting, Sawing, Stamping, Shearing, Riveting, Punching.
3. Machines and Tools used by the Makers of Gold, Silver, and Plated Goods.
4. Machines and Tools used by the Makers of Cutlery, Nails, Screws, Pins, Needles, Buttons, and metallic Pens, &c.
5. Machines and Tools used by Locksmiths, Diesinkers, &c.

C. Manufactures of Mineral Substances and Mining Machinery. (See also Section I.)

1. Machines and Tools for the preparation and working of all kinds of Glass, Stone, Granite, Alabaster, Slate, Clay, &c.
2. Machines and Tools used in the preparation and working of Gems, &c.

D. Manufactures of Vegetable Substances.

1. Machines and Tools for the preparation and working of all kinds of Wood.
2. Mills and other machinery for Grinding, Crushing, or Preparing Vegetable Products.

E. Manufacture of Animal Substances.

Machinery and Tools for working in Horn, Bone, Ivory, Leather, &c.

F. Machinery and Apparatus for Brewing, Distilling, and Manufacturing Chemistry.

VII. *Civil Engineering, Architectural, and Building Contrivances.*

A. Foundations and Building Contrivances connected with Hydraulic Works.

1. Application of the Screw Pile for the Foundations of Piers, Jetties, &c., Beacons, and Ships' Moorings.
2. Pneumatic Piling, Machinery illustrative of the mode of sinking and guiding the Cylinders, also Contrivances for overcoming difficulties where obstructions are offered to their sinking.
3. Coffer-dams on soft and rock bottoms, and Apparatus connected with them.
4. Foundations of Lighthouses exposed to the violent action of the sea.
5. Diving-bells, Helmets, and Apparatus connected with them.
6. Boring Tools, and Contrivances for ascertaining the stratification on Sites of intended Structures.

B. Scaffolding and Centerings.

1. Scaffolding for the erection of Brick Chimney Shafts, Columns of Masonry, Towers, and Spires.
2. Portable Scaffoldings, Ladders, and Fire Escapes.
3. Scaffolding for the erection of Monolithic Blocks, as Obelisks, &c., and for the hoisting of great Weights.
4. Fixed and Turning Scaffolding for the repairs, &c., of Domes, &c., internally and externally.
5. Scaffolding and Contrivances for the erection of large Girder Bridges (as Britannia Bridge).
6. Centerings for Arched Bridges, Domes, and Vaults.
7. Centerings for Tunnels, Shields, and Contrivances for facilitating their excavation.

C. Bridges, Tunnels, and Engineering Contrivances for crossing Rivers, Ravines, &c.

1. Timber Bridges.
2. Cast-iron Bridges.
3. Wrought-iron Bridges (Girder or Lattice).
4. Turning or Swing Bridges.
5. Lifting or Bascule Bridges.
6. Draw and Rolling Bridges.
7. Suspension Bridges.
8. Temporary Bridges. (See also VIII. M.)
9. Floating Bridges, as across the Hamoaze, and to receive Railway Trains, as across the Humber.
10. Examples of Brick and Stone Bridges.

D. Dock, Harbour, River, and Canal Works.

1. Docks and Slips for the building and repair of Ships.
2. Mercantile Docks, and Arrangements connected therewith, for the loading and unloading of Ships.
3. Sea and Canal Locks, Gates and Entrances, Stopgates, Sluices, &c.
4. Marine Railway Slips and Hydraulic Docks.
5. Harbours of Refuge.
6. Breakwaters, Piers, Jetties, Wharfs, and Landing-piers.
7. Groynes, Sea-defences, &c.
8. Perpendicular Lifts for Canals, and other Engineering Contrivances instead of Locks.
9. Dredging-machines, Hedgehogs, and other Machines employed in Harbour Works, for removing Shoals, &c.

E. Lighthouses and Beacons.

F. Roofs, Buildings, and Contrivances for covering large Areas.

1. Examples of Timber and Iron Trusses.
2. Roofs for Markets, Railway Stations, &c.
3. Roofs for Theatres.
4. Fire-proof Buildings, arranged so as to be applicable to the economical methods of construction.
5. Coverings for Roofs.

G. Water-Works, and the Engineering Contrivances connected with the Obtaining, Storing, and Distribution of Water in Towns.

1. Well-sinking and Boring, and the Apparatus connected therewith.
2. Storing, Filtering, and Distributing Reservoirs, and the Contrivances connected with them.
3. Contrivances for maintaining and producing efficient Heads, and the Apparatus connected with Street Mains.
4. Services, and Apparatus connected with Domestic Water Supply. (See also V., B.)

H. Gas-Works, and Contrivances connected with the economical Production of Artificial Light.

1. Retorts and Distillatory Apparatus.
2. Condensing, Separating, and Purifying Apparatus.
3. Governors and Station Meters.
4. Gauges, Valves, and contrivances connected with the Mains for the Distribution of Gas. (See also XXII.)

I. Sewerage, Cleansing, Paving, and the Contrivances connected with the Sanitary Condition of Towns.

1. Forms of Sewers, their Entrances and Junctions.
2. Contrivances for Cleansing, Flushing, and Ventilating Sewers.
3. Contrivances for removing and distributing Sewage.
4. Traps, and other means of preventing emanations. (See also XXII.)
5. House Drains, and the Internal Sanitary arrangements of Houses. (See also XXII.)
6. Pavements.

J. Warming and Ventilating Domestic Residences, and the Contrivances connected therewith.

1. Arrangements for Warming, as with Hot Air, Water, Steam, &c.
2. Contrivances for preventing Smoke, and Chimney-sweeping Machines.
3. Contrivances for Ventilation on a large Scale.

K. Miscellaneous.

VIII. *Naval Architecture, Military Engineering; Ordnance, Armour, and Accoutrements.*

A. Illustrations by Models of Shipbuilding for purposes of commerce.

1. Ships.
2. Barks.
3. Brigs and Brigantines.
4. Snows and Ketches.
5. Schooners.
6. Sloops and Cutters.
7. Luggers, Barges, &c.

B. Illustrations by Models of Shipbuilding for purposes of War.

1. Ships of the Line.
2. Frigates.
3. Sloops, Corvettes, and Brigs.
4. Cutters, Brigantines, Ketches, Schooners, Barges, &c.
5. Bomb or Mortar Vessels, Fire-ships, Gun-boats, &c.

C. Illustrations by Models of Shipbuilding for the application of Steam or other Powers.

1. Great War Steamers.
2. Steam-vessels of large burden for long Passages.
3. Steam-vessels for Inland, River, or Lake Navigation.
4. Sailing-vessels fitted for the temporary appliance of Steam or Human Power.
5. Miscellaneous.

D. Vessels used for Amusement, and Small Vessels generally.
1. Seagoing Yachts of all kinds.
2. River Yachts, and Pleasure Boats of a smaller class.
3. Rowing Boats of all kinds.
4. Fishing Boats and Vessels.
5. Life Boats and Paddle-box Boats.

E. Rigging, Anchors, Windlasses, Capstans, Sheathing, and Articles connected with practical Seamanship and the saving of Life from Shipwreck.

F. Infantry Army-Clothing and Accoutrements.

G. Cavalry Army-Clothing and Accoutrements.

H. Camp Equipage, such as Marquees, Tents, &c.

I. Naval Gunnery, and Weapons of Attack and Defence more especially adapted to Naval Purposes.

J. Artillery Equipments, both in Garrison and the Field, Machines for Mounting and Dismounting Ordnance.
1. Garrison Equipments.
2. Field Equipments.
3. Machinery for Mounting and Dismounting and transporting Ordnance, Carriages, &c.

K. Ordnance and Projectiles.
1. Guns.
2. Howitzers.
3. Mortars.
4. Shots, Shells, and other Projectiles.

L. Small Arms.
1. Rifles.
2. Muskets.
3. Carbines.
4. Pistols.
5. Lances.
6. Swords.
7. Bayonets.
8. Cartridges.

M. Military Engineering, Field Equipments, Methods of Passing Rivers and other Obstacles, the Attack and Defence of Fortresses, and Field Fortification.
1. Field Engineer Equipments.
2. Military Bridges, Pontoons, Rafts, Boats, &c.
3. Field Fortification and Materials used in the attack and defence of Fortresses.
4. Permanent Fortification.

IX. *Agricultural and Horticultural Implements.*

A. Implements for Tillage.
1. Ploughs, including Subsoil Ploughs and Pulverisers.
2. Harrows.
3. Sacrifiers, Cultivators, and Grubbers.
4. Clod Crushers and Norwegian Harrows.
5. Rollers.
6. Digging and Trenching Machines.

B. Drilling, Sowing, Manuring, and Hoeing Machines.
1. Pressers.
2. Drills.
3. Dibblers.
4. Horse Hoes.
5. Broadcast Sowing Machines.
6. Contrivances connected with the distribution of Manure.

C. Harvesting Machines.
1. Machines for cutting Corn or Grass.
2. Tedding Machines for Hay.
3. Rakes for Hay, Corn, Stubble, &c.

D. Barn Machinery.
1. Steam Engines, and Water-power Machines.
2. Horse Works.
3. Thrashing Machines.
4. Straw Shakers.
5. Winnowing, Corn Cleaning, and Barley Hummelling.
6. Crushing and Splitting Mills.
7. Flour and Meal Mills.
8. Chaff Cutters.
9. Corn Weighing and Meters.
10. Gorse Bruisers and Cutters.
11. Chicory Cutters.
12. Cider Presses.

E. Field, Fold, and Yard Machinery.
1. Turnip-cutters.
2. Root Grating and Squeezing Machines.
3. Potato-washers.
4. Steaming Apparatus.
5. Feeding Apparatus.
6. Weighing Machines for Cattle, &c. (See G.V.)
7. Watering Engines, for Fire or Garden Purposes. (See D. V.)
8. Contrivances connected with the Stack-yard and Storing.
9. Contrivances for Fencing, Folding, &c.
10. Fittings for Stables, Cow-houses, &c.

F. Agricultural Carriages, Harness, and Gear.
1. Waggons, Carts, &c.
2. Brakes.
3. Separate parts, as Wheels, Axles, &c.
4. Harness and Gear.

G. Drainage Implements.
1. Machines for making Pipes, Tiles, and Bricks.
2. Implements for Draining, and Tools.
3. Tiles, Pipes, and other Materials used in Draining.
4. Scoop Wheels and other Machines used in Draining or Lifting Water.
5. Machines and Contrivances for Irrigating Lands.
6. Sluices, Draw Gates, &c.

H. Dairy Implements.
1. Churns.
2. Cheese-presses.
3. Miscellaneous Contrivances used in the Dairy.

I. Miscellaneous Implements used in Agriculture.
1. Rick Ventilator.
2. Ladders.
3. Pitch and Tar Melters.
4. Sheep-dipping Apparatus.
5. Farm Railway.
6. Models of Farm Buildings.
7. Alarm Gun for Protecting Crops.
8. Beehives.
9. Instruments for Cattle, Probangs, &c.
10. Tree Remover.
11. Various Miscellaneous Articles.

J. Garden Engines and Tools.

X. *Philosophical Instruments, and Processes depending upon their use: Musical, Horological, and Surgical Instruments.*

A. Instruments for the Measurement of Space.
1. In fixed observatories, as Transits, Transit Circles, great Quadrants, Mural Circles, Zenith Sectors, Altarimeters, Equatorials, Collimators, &c.
2. For Nautical Astronomy and Observations, as Sextants, Reflecting and Repeating Circles, Dip Sectors, &c.
3. Astronomical and Topographical Illustrations, as Globes, Orreries, Planetariums, Maps, Charts, &c.
4. Optical Instruments, as great Refracting and Reflecting Telescopes, with their appurtenances, equatorial motions, &c.
5. Apparatus subordinate to Graduated Instruments, as divided Object Glasses and Heliometers, Eyepieces, Micrometers, Micrometer Microscopes, &c.
6. Survey Instruments.
    a. Topographical, as Base Apparatus, Theodolites, Repeating Circles, Geodetic Signals, Levelling Apparatus, Miners' and Prismatic Compasses, Pocket Sextants, Perambulators, Pedometers.
    b. Hydrographical, as Sounding Machines, Patent Logs, Current Meters, Silometers.

A. Instruments to Measure the Effects of Mechanical and Physical Forces.
1. Mechanical, as Dynamometers, Tachymeters.
2. Mass (Weighing Instruments), as Weighing Machines, Scales, Chemical and Assay Balances.
3. Density, as Areometers and other Instruments to determine Specific Gravity, Invariable Pendulums, Atwood's Machine.
4. To measure other Physical Effects, including Meteorological Instruments, as Barometers, Hydrometers, Eudiometers, Thermometers, Pyrometers, Electrometers, Rheometers, Magnetometers, &c.

C. Instruments to illustrate the Laws of Mechanical and Physical Science.

1. "Kinematics,"—Instruments to exhibit and describe Motions and their Combinations, as Compasses, Pentagraphs, Instruments for describing Elliptical and other Figures, &c.
2. Mechanics, or Instruments to illustrate the Laws of Static and Dynamic Forces.
    - *a.* Stereo-Mechanics, as for illustrating Mechanical Powers, accelerated and retarded Motion, Equilibrium and Parallelogram of Forces, Levers, Cathetometers, Centripetal and Centrifugal Forces, Elasticity, &c.
    - *b.* Hydro-Mechanics, as Instruments to illustrate the Motion and Impinging Force of Waves, &c.
    - *c.* Pneumo-Mechanics, as Apparatus connected with the Air-Pump, &c.
3. Instruments to illustrate the Laws of Corpuscular Forces, as Whitworth's Planes, Endosmometers, &c.
4. Instruments to illustrate the Laws of Sound.
5. „ „ „ Light.
6. „ „ „ Heat.
7. „ „ „ Electricity, including Voltaic and Thermo-Electricity, Magnetism, Electro-Magnetism, Magnetic Electricity, Dia-Magnetism, &c.

D. Application of Mechanical and Physical Science to Useful Purposes, not included in any of the preceding or subsequent Sections.

1. Mechanics.
    - *a.* Stereo-Mechanics } when not included in Sections
    - *b.* Hydro-Mechanics } describing their more extended uses.
    - *c.* Pneumo-Mechanics, as Air Pumps, Rarefying and Condensing, Diving Bells, Air Balloons, &c.
2. Sound (not including Musical Instruments).
    - *a.* Instruments to assist Hearing.
    - *b.* Alarums, Bells.
    - *c.* Models of Acoustical Buildings, &c.
3. Light—Instruments to assist Vision, as smaller Telescopes, Opera Glasses, Spectacles, Microscopes, Lenses, Mirrors, Signals, Visual Telegraphs, Lighthouses, Optical Illusions, Gas and Solar Microscopes, Cameras, Photography, Polarization of Light, &c.
4. Heat—Apparatus for producing Heat, for Freezing, Thermostats, Burning Lenses, and Mirrors, &c.
5. Magnetism and Electricity—Mariner's Compasses, Electric and Electro-Magnetic Telegraphs, Electric Light, applications of Electro-Magnetism as a Motive Power, Therapeutic applications of Electricity, Electrotype Apparatus and Specimens, &c.

E. Chemical and Pharmaceutical Apparatus.

F. Miscellaneous.

X. *a.* *Musical Instruments, &c.*

A. Wind Instruments.

1. Wood—
    - Flutes (also in Metal, &c.)
    - Flageolets.
    - Oboes.
    - Clarinets.
    - Bassoons.
    - Serpents.
2. Metal—
    - French Horns.
    - Trumpets.
    - Bugle Horns.
    - Cornets à Pistons.
    - Cornopeans.
    - Trombones.
    - Ophicleides.

B. Stringed Instruments.

Harps.
Guitars.
Violins.
Violas.
Violoncellos.
Double Basses.

C. Keyed Instruments with fixed Tones.

Organs.
Pianofortes.
Seraphines.
Harmoniums.
Concertinas.
Accordions.

D. Instruments of Percussion.

1. Drums—
    - Bass Drums.
    - Kettle Drums.
    - Side Drums.
    - Tambourines.
2. Cymbals—
    - Triangles.

E. Automatic Instruments.

Mechanical Organs.
Musical Boxes, &c.

F. Miscellaneous Articles in connexion with Musical Instruments.

Tuning Forks, Tuning Hammers, Pitch Pipes, &c. Wire Strings, Catgut Strings, &c.

G. Musical Diagrams.

X. *b.* *Horology.*

A. Great Clocks for Churches, Castles, Stables, and Public Buildings in general.

1. With 3 and 4 wheel Trains.
2. With Remontoires and with various Escapements.
3. To strike the Hours, and the Hours and Quarters.
4. The various Compensation Pendulums in use.
5. The various modes of making the Work to carry the Hands, and communicating the motion from the Clock to the Hands.
6. Electric or Magneto-electric Clocks.

B. Astronomical Clocks.

1. The various Escapements employed.
2. The various Compensation Pendulums used.
3. Equation Clocks.
4. Clocks, commonly called Journeymen Clocks, for Observatories.

C. Clocks applied in Registration.

1. To register the Barometer daily for twelve months, or other periods.
2. To register Tides and Winds.
3. To register the punctual attendance of Watchmen and others.

D. Clocks showing different Phenomena.

1. Cycle of the Sun and Moon, Eclipses, Moon's Age, Equation of Time, the Golden Number, Tides, &c.

E. Clocks for the Common Purposes of Life.

1. Weight Clocks.
2. Spring Clocks with Pendulums.
3. Balance Clocks of various descriptions.

F. Clocks and Time-pieces in Decorated Cases, commonly called Ornamental Clocks, for Drawing-rooms, Libraries, &c.

1. In Metal Cases, Gilt and Lacquered.
2. In Buhl Cases.
3. In Wood Cases.
4. In China Cases.

G. Sundries applicable to Clocks.

1. The various modes by which Clocks are kept going while being wound.
2. The various Escapements employed in Clocks of different descriptions.
3. Various portions of Mechanism forming parts of, or applicable to, Clocks.

H. Marine Chronometers.

1. Eight-day.
2. Two-day.
3. Thirty-hour.
4. The various descriptions of Compensation Balances applied to Chronometers.
5. The various descriptions of Pendulum Springs applied to Chronometers.
6. Pocket Chronometers.

I. Pocket Watches of various descriptions.

1. For measuring Minute Portions of Time and registering Observations.
2. With Compensation Balances.
3. „ Duplex Escapement.
4. „ Horizontal Escapement.
5. „ Lever Escapement upon different constructions.
6. „ the old original Vertical Escapement.
7. Repeaters upon different constructions to strike the Hours and Quarters.
8. The same to strike the Hours, Quarters, and Half-quarters.
9. The same to strike the Hours, Quarters, and Minutes.
10. Clock-watches to strike the Hours and Quarters in a similar manner to Clocks.

11. Clock-watches, and, in addition, Repeaters.
12. Watches with Alarums.
13. Watches known by the denomination of Ladies' Watches, with the Cases decorated in various ways.
14. Various portions of Mechanism forming parts of Watches.

J. WATCHES FOR DIFFERENT MARKETS—

1. As for Turkey, with three Cases and Turkish Dials.
2. For China, with peculiar Cases and Dials.
3. For India and South America.
4. For Home Country districts.

K. MISCELLANEOUS.

X. *c. Surgical Instruments.*

A. FOR OPERATIONS ON THE EYE.

Special Instruments for—

1. Operation on the Eyelids.
2. Fistula Lachrymalis.
3. Strabismus.
4. Artificial Pupil.
5. Cataract.
    By Depression.
    By Extraction.
    - *a.* Including Elevators in Silver and Ivory, Fine Bistouries, Trocars, Canulas, Styles, Sounds, various Needles, &c.
    - *b.* Cataract Knives, Hooks, Capsular Forceps, &c.

B. OPERATION ON THE EAR.

Special Instruments for—

1. Exploration of the Aural and Eustachian Passages.
    - *a.* Sounds, Catheters, Speculums, &c.
2. The Conveyance of Air or Liquid into the Tympanic Cavity.
    - *b.* Pneumatic and other Syringes in Metal, Glass, Caoutchouc, &c.
3. The Removal of Foreign Bodies from the Meatus.
    - *a.* Levers, Branch Forceps, &c.
4. Perforation of, and other Operations on, the Membrana Tympani.
5. The Conduction of Sound.
    - *a.* Including all kinds of Acoustic Instruments and Contrivances, Ear Cornets, Speaking Trumpets, &c.

C. OPERATIONS ON THE NOSE—NASAL FOSSÆ AND ANTRUM.

Special Instruments for—

1. The Removal of Polypi.
    - *a.* Various Forceps, Porte-ligatures, Serre-nœuds, &c.
2. The Removal of Extraneous Substances.
3. The Arrest of Hæmorrhage from the Posterior Nares.
    - *a.* Including all Contrivances for "Tamponnement."
4. Exploration and Injection of the Maxillary Sinus.
    - *a.* Including Jourdain's Sounds, Catheters, &c.
5. Perforation and Injection of the Antrum.
    - *a.* Including Liston's Drills, Antrum Syringes, Plugs, &c.

D. OPERATIONS OF THE MOUTH AND PHARYNX.

Special Instruments for—

1. Hare Lip.
2. Operations on the Teeth (Dental Instruments).
3. Myotomy and Ligature of the Tongue.
4. Cleft Palate and other Operations on the Roof of the Mouth (Staphyloraphic Instruments).
    - *a.* Including Obturators, Cleft and Notched Needles, Palate Holders, Porte-Sutures, &c.
5. Excision of the Uvula and Tonsils.
6. Cauterisation and other Operations on the Pharynx.
    - *a.* Tonsillar Guillotines, Pharyngotomes, &c.
7. Salivary Fistula.
    - *b.* Parotidean Canulas, Leaden Threads, &c.

E. OPERATIONS ON THE THORAX AND RESPIRATORY ORGANS.

Instruments for—

1. Tracheotomy and Laryngotomy.
    - *a.* Including Marshall Hall's Tracheotome, Sampson's Springs and Tubes, &c.
2. The Removal of Foreign Bodies from the Larynx, Trachea, and Bronchi.
3. Paracentesis Thoracis (Empyema).
4. Various Purposes.
    - *a.* Including Inhalers for the administration of Chloroform, Æther, and other Medicinal vapours. *b.* Instruments used to restore Suspended Animation. *c.* Respirators in all Materials.
5. Physical Examination of the Chest.
    - *a.* Instruments for Auscultation, Percussion, and Admeasurement of the Chest; Stethoscopes and Pleximeters in all materials; Spirometers and Stethometers, as suggested by Quain and Sibson, &c.

F. OPERATIONS ON THE ABDOMINAL WALLS AND ALIMENTARY CANAL.

Special Instruments for—

1. Stricture and other morbid states of the Œsophagus, the removal of Foreign Bodies, &c.
    - *a.* Including Œsophagus Bougies and Probangs in elastic gum and other materials, Œsophagotomes, Gullet-forceps, &c.
2. The introduction and withdrawal of Fluids from the Stomach; the removal of Poison, &c.
    - *a.* The Stomach Pump and its appendages, Enema Syringes, &c.
3. The formation and maintenance of artificial Anus.
    - *a.* Enterotomes, Porte-Sutures, &c., by Dupuytren, Blandin, and others.
4. Prolapsus Ani.
    - *a.* All kinds of Rectum-Plugs, in metal, elastic gum, &c.
5. Fistula, Fissures, and Vegetations in Ano.
    - *a.* Fistula Knives, Directors, &c.
    - *b.* Porte-ligatures (on Luke's and Sampson's plan).
6. Hernia.
    - *a.* Cutting Instruments for its radical cure.
    - *b.* Trusses and all artificial means of support.
7. Paracentesis Abdominis.
8. Physical examination of the Rectum.
    - *a.* Various Speculums (by Hilton and others).

G. OPERATIONS ON THE GENITO-URINARY SYSTEM IN THE MALE.

Instruments for—

1. Lithotomy.
    - *a.* Including Lithotomes, Gorgets, Staffs, Forceps, Scoops, &c.
2. Lithotrity.
    - *a.* Lithotrites, which disintegrate the Stone by Perforation.
      Ditto ditto by Concentric Pressure.
      Ditto ditto by Percussion.
    - *b.* Syringes and other Instruments to inject and explore the Bladder.
    - *c.* Dilators, Sliding-scoops, and Apparatus to remove Calculi impacted in the Urethra; Instruments for Lithectasy, &c.
3. Urinary Fistula.
    - *a.* Including all Urethroplastic Instruments, Urethrotomes, &c., for Recto-Urethral, Perineal, and Recto-Vesical Fistulæ.
4. Stricture, Prostatic and Vesical Disease, and retention of Urine.
    - *a.* Every variety of Catheter, Bougie, Sound, Porte-Caustique, and Urinal; Curved Trocars for Puncture of the Bladder above the Pubes, through the Rectum, &c.
5. Phymosis.
    - *a.* Apparatus employed by Jews. *b.* By the Profession.
6. Hydrocele.
7. Variocele.
    - *a.* Including Instruments for obliteration of the Spermatic Veins (Ricords'), as well as those for simple support; Suspensory and other Bandages; Scrotal Rings, &c.

H. OPERATIONS ON THE GENITO-URINARY SYSTEM IN THE FEMALE.

Instruments for—

1. Exploration.
    - *a.* Including Speculums in all Materials, Sounds, Dilators, &c.
2. Operations on the Uterus, Vagina, and Cervix Uteri.

  a. Hysterotomes and Instruments for Paracentecis Uteri (Lisfranc's and Simpson's), Uterine Scissors and dressing Forceps (curved and straight), Porte-Caustiques, &c.
3. Polipus Uteri.
  a. Vulcella and other Forceps, Porte-ligatures, Serre-nœuds, &c.
4. Prolapsus and Procidentia Uteri.
  a. Including Pessaries, Bandages, and artificial support of all kinds.
5. Vesico-Vaginal Fistula and Recto-Vaginal Fistula.
  a. Hancock's new Instruments, Urinary Receptacles, &c.
6. Obstetrical Purposes.
  a. Including all Midwifery Instruments, and Contrivances to remedy Lacerated Perineum.

I. Operations on the Extremities.
Special Instruments for—
1. Amputations.
  a. Army (portable) and Hospital Cases, &c.
2. The Adjustment of Fractures.
  a. Including Splints, Inclined Planes, Pads, Slings, and Bandages, in all Materials.
3. The Reduction of Dislocations.
  a. Pulleys, Rings, Staples, &c.

K. Operations on the Osseous System.
Special Instruments for—
1. Trepanning.
2. Resection and Exarticulation.
3. The Extraction of Sequestra, &c.

L. Operations on the Vascular System.
Instruments for—
1. Venæsection.
  a. Cupping Instruments, Lancets, Leech tubes, &c.
2. The Control of Hæmorrhage.
  a. Tourniquets, Compressors, Torsion Forceps, &c.
3. Transfusion.
4. Aneurism.
  By Ligature:—a. Aneurism Needles, Porte-ligatures, Sampson's Speculum, &c.
  By Compression: — b. New Instruments, by Wyld, Bellingham, and others.
5. Nævus.
  a. Needles, Porte-aiguilles, &c. (Liston's and Brodie's).
6. Varices.
  a. Including Elastic Bandages, Stockings, Anclets, &c.

M. Autoplastic and Orthopædic Operations.
Special Instruments for—
1. The various Taliacotian Processes.
  a. Rhinoplasty.
  b. Chiloplasty, &c.
2. Tenotomy and Myotomy.
  a. Including long-bladed Knives for the subcutaneous division of Muscles and Tendons, &c.
3. Mechanical Compensation of Lost Parts.
  a. Artificial Eyes, Noses, Ears, Chins, Palates, Teeth, Hands, Arms, Legs, &c.
4. Orthopædic Processes.
  a. Including all Orthopædic Apparatus, Back and Leg Boards and Irons, Stays, Belts, Supports, Suspenders, Boots, Shoes for the cure of Bunions (Lanagan's).

N. Dressing Instruments.
  a. Surgeons' Pocket Cases and their usual contents; Spring Bistouries, Tenaculums, Scalpels, Scissors, Forceps, Spatulæ, Probes and Directors, Needles, Ligature-Silks, &c.

O. Miscellaneous Philosophical Apparatus applied to the investigation and treatment of Dis[illegible]
  a. Microscopes, Engiscopes, and Lenses; Ur[illegible] and Thermometers; Volta-electric Ap[illegible] rious illuminating Speculums; Instru[illegible] Rubber for the application of In[illegible] per's Water Cushions for the [illegible] any temperature; Spongi[illegible] Plaisters, Collodion, Nipple [illegible] &c.

P. Surgical Tables, Beds, Mattresses, Chairs, Cradles, Rests, &c.

Q. Post mortem and Dissecting Instruments, and Instruments for Embalmment.

R. Instruments applied to Veterinary Purposes.

MANUFACTURES.

XI. *Cotton.*

A. Cotton Yarn and Thread.
1. Grey Twist in Hanks and Bobbins, from No. 20 to 600.
  White and Bleached Yarn.
  Dyed Yarn, assorted Colours.
  „ Turkey-red and Pink.
2. Cotton Thread.—
  Two-fold Lace; 2, 3, 4, 6, and 9-cord sewings.
  Two-fold Lisle; knittings.
  Crochet Cottons.
  Wire Thread.
3. Crape Yarn—
  Bleached.
  Coloured.

B. Calicoes.
  Sheetings (Grey and Bleached)—
    $\frac{7}{8}$ and $\frac{9}{8}$ Super.
  Shirtings (Grey and Bleached).
  Domestics.
  Madapollams—
    $\frac{7}{8}$ and $\frac{9}{8}$, and 40-inch Printers'.
  Long-cloths (Plain and Twilled)—
    Imitation Irish.

C. Cords and Beaverteens.
1. $\frac{1}{2}$ ell and $\frac{3}{4}$ Cords.
  Genoa.
  Beaverteens.
2. Drabbetts.
  Twilletts.
  Fancy Drills.
  Grey Twills.
  Swansdowns.
  Jeans.
  Ticks.
3. Velvets and Velveteens.

D. Muslins, &c.
1. Cambric and Jaconnet—
  Mulls and Books.
  Bishop and Victoria Lawns, &c.
  Jaconnet, Organdies, Lenos, and Fancy Checks for Printing (Grey and Bleached).
2. Figured Muslins—
  Lappets, Lenos, and Netts, White and Dyed.
  Jacquard-made Goods.
  Lappets, Japan Spots and Honeycombs.
  „ Striped and Corded.
  „ Allover and Diagonal Spider.
  „ Bengal Scarf Spot, assorted.
  Harness, assorted.
  „ Garments.
  Window Curtains.
  „ Spot.
  Book Jaconnet and Dacca Lappets.
  Lenos, Plain.
  „ Figured.
  Small Stripe and Check Doriahs.
  Mexican Lappets, Coloured and White.
  Turkey Gauze, White and Dyed.
3. Shawls, Handkerchiefs, and Dresses—
  Imitation Cambric Handkerchiefs, Plain and Embroidered.
  Lappet Shawls.
  Book Muslin Dresses, Checks.
  [illegible] Cords.
  [illegible] hiefs.
  [illegible] llams.
  [illegible] ious Finishes.
  [illegible] Finish.
  [illegible] inish.
  [illegible] rd. Elastic, and
  [illegible] nented.

E. DIMITIES, &c.
1. Furniture Dimities, Plain and Figured—
Hair, Cord, and India, Plain and Figured.
Quilting.
Satteen and Twilled Jean.
2. Marseilles and Summer Quilts—
Counterpanes (White and Coloured).
Toilet Covers (Plain and Coloured).
Anti-Macassars.
Grey Sheets.
Window Hollands.
Cotton Diapers and Damasks.

F. COLOURED WOVEN COTTON.
1. Handkerchiefs for the Pocket, Head, Neck, and Shoulders—
Imitation Madras and Pulicat.
„ Java and Manilla
Fancy White Grounds, Checks.
Imitation Manilla Pine-Apple Cloth.
„ White Cambric.
„ „ Figured Borders.
Cravats, assorted colours.
2. Ginghams.
Common Light Grounds, assorted, Plain.
„ Dark Grounds, assorted, Plain.
Earlston Ginghams.
Power-loom Seersuckers and Checks.
Turkey-red grounds.
Blue and Black heavy Checks.
Muslin Ground, Stripes and Checks.
Furniture, Stripes and Checks.
Coloured Diapers.
Crossover Stripes.
Jean Stripes.
Derries.
Hungarians.
Umbrella Ginghams.
3. Dresses, Scarfs, &c.
Java Bugis, and Manilla Sarongs.
„ Chindies and Scarfs.
4. Zebras—
Blue and White Striped Dresses.
Orange-pine „
Blue-pine. „
Robe de Chambre.

G. OILED CALICOES OR CAMBRICS FOR PACKING.

XII. *Woollen and Worsted.*

A. BROAD CLOTHS.
1. Single Milled, 52 to 63 inches wide.
Wool-dyed Woaded Colours—
Blue.
Black.
Medleys.
Oxford and other Mixtures.
N.B. The term "Medleys" includes all Wool-dyed Colours, excepting Blue and Black.
Wool-dyed, common colour, unwoaded.
Black.
Medleys.
Oxford and other Mixtures.
Drab.
Piece-dyed, Woaded Colours—
Black.
Blue.
Fancy Colours.
Piece-dyed, unwoaded.
Black.
Scarlet.
Gentian.
Other Fancy Colours.

A. BROAD CLOTHS—
2. Double Milled, 52 to 57 inches wide.
Subdivided same as No. 1.
3. Medium-Cloths, 54 to 63 inches wide.
Subdivided same as No. 1.
4. Ladies'-Cloths, 54 to 63 inches wide.
Subdivided same as No. 1.
5. Venetians, 54 to 58 inches wide.
Subdivided same as No. 1.
6. Army-cloth, 52 to 54 inches wide.
Subdivided same as No. 1.
7. Beavers.
Subdivided same as No. 1.
8. Pilots.
Subdivided same as No. 1.
9. Mohair, 54 to 58 inches wide.
Subdivided same as No. 1.
10. Cloakings, 54 to 58 inches wide.
Subdivided same as No. 1.
11. Tweeds—
Single milled.
Double milled.
Treble milled.
12. China Stripe Cloths, list, piece dyed, and other Cloths, 60 inches wide.
13. India Cloths, piece dyed, 60 inches wide.
14. Billiard Cloths, piece dyed, 72 to 81 inches wide.
15. Elastic Glove Cloth, 54 to 70 inches wide.
Subdivided same as No. 1.
16. Union Cloths, Cotton Warps, piece dyed, 52 to 54 inches wide.
17. Double Colours, piece dyed, 54 to 63 inches wide.

B. NARROW CLOTHS.
1. Cassimere double milled, 27 to 29 inches wide.
Subdivided same as Broad Cloths, No. 1.
2. Cassimere, single milled, 27 to 29 inches wide.
Subdivided same as No. 1.
3. Doe-Skins, treble milled, 27 to 29 inches wide.
Subdivided same as No. 1.
4. Doe-Skins, double milled, 27 to 29 inches wide.
Subdivided same as No. 1.
5. Doe-Skins, single milled, 27 to 29 inches wide.
Subdivided same as No. 1.
6. Cashmerettes, 27 to 29 inches wide.
All Colours.
7. Tweeds, Wool dyed, 27 to 29 inches wide.
Double milled.
Single milled.
8. Fancy Trowserings.

C. FLANNEL.
1. Saxony Flannel.
White.
Coloured.
2. Various Flannels.
Lancashire.
Real Welsh.
Imitation Welsh.
Bath Coating.

D. BLANKETS.
1. Cloth Blankets.
2. Superfine Blankets.
3. Medium Blankets.
4. Ordinary Blankets.

E. WOOLLEN CLOAKING.
1. Plain.
2. Mixtures.
3. Fancy.

F. SERGES.
Long Ells, White and Coloured.

G. TARTANS.
1. Plain.
2. Fancy.

H. WORSTED STUFF GOODS.
1. Fabrics composed entirely of Wool.
Merinos.
Shalloons, Says, Serges, and Plainbacks.
Calimancos, Plain and Figured.
Lastings, Princettas, Serges de Berry.
Coatings.
De Laines.
Alepinas.
Durants and Buntings.
Moreens.
Damasks.
Damask Aprons, Damask Table Covers, &c.
Russels.
Camlets.
2. Fabrics composed of Wool and Cotton.
Cobourg and Paramatta Cloths.
Union Double Twills.
Plain Orleans Cloths, Single and Double Warps.
Plain Muslin de Laines, Barèges, &c.
Shawl Cloths.

Union Coatings.
„ Lastings, Princettas, and Serges de Berry.
Stockinetts.
Fancy Lastings.
„ Worsted and Cotton Goods.
Figured Cobourgs, Orleans, &c.
Aprons, plain and figured.
Linings, plain and figured.
Union Damasks.
„ Damask Table Covers, &c.

3. Fabrics composed of Wool and Silk.
    Silk-warp Cobourgs and Orleans.
    „ Double Twills.
    „ Coatings.
    „ Russels.
    Silk-weft Lastings.
    Silk-warp Damasks.
4. Fancy Goods composed of Wool, Silk, and Cotton.
5. Fabrics composed of Alpaca and Mohair mixed with Cotton or Silk.
    Plain Alpaca Lustres.
    „ Mixtures.
    Twilled Alpaca Mixtures.
    Plain Mohair Lustres.
    Silk-warp Alpaca Lustres.
    Alpaca and Mohair Linings.
    „ Mohair, and Silk Fancy Goods.
    „ Umbrella and Parasol Cloth.

I. Woollen, Worsted, Alpaca, and Mohair Yarns.

XIII. *Silk and Velvet.*

A. Silk Yarns.
1. Spun Silks.
2. Thrown Silks.
3. Sewing Silks.

B. Plain Silks.
1. Gros, Sarsnets, Persians, Satinets, Armures, and other plain Silks.
2. Satins, black or coloured.
3. Armozines, Barattees, and Serges.
4. Serges and Lutestrings, for Parasols and Umbrellas.
5. Brussells, Ducape, Satin, and other plain Cravats for Men's wear.
6. Satin twilled and other plain Handkerchiefs for Ladies' wear.
7. Bandanas, Corahs, and other Cloth for Printing.
8. Spun Silk Handkerchiefs (for printing.)

C. Fancy Silks.
1. Shot, striped, checked, watered (moiré), shaded, clouded (chiné), or striped with satin.
2. Floret, Damask, Tobine, Brocade, and other Figured Silks.
3. Figured Vestings, Cravats, and Scarfs.
4. Figured Handkerchiefs, Scarfs, Aprons, and Veils, for Ladies' wear.
5. Parasol and Umbrella Silks figured, or with figured borders.
6. Furniture Damasks and Brocades.
7. Gold and Silver Tissues, figured and plain.
8. Figured Pocket Handkerchiefs for Gentlemen's wear.

D. Velvets.
1. Plain Velvets, black and coloured.
2. Plain Terry.
3. Figured and Embossed Velvets.
4. Plush (Ladies', &c.)
5. Hat Plush.

E. Gauzes and Crapes.
1. Lisse, Areophane, and other Gauzes.
2. Plain and coloured Crapes.
3. Figured Gauze (Blonde, &c.).
4. Fancy Gauze or Crape Handkerchiefs.

F. Plain Ribbons.
1. Sarsnet and Lutestring Ribbon.
2. Satin Ribbons.
3. Gauze Ribbons.
4. Velvet Bands or Bindings.

G. Fancy Ribbons.
1. Shot, striped, checked, shaded, clouded (chiné), or striped with satin.
2. Figured or Brocaded.
3. Gauze or Crape, with brocaded or cut figures.
4. Embossed Satin.
5. Figured or checked Velvet.

XIV. *Manufactures from Flax and Hemp.*

A. Flax Fibre.
1. Steeped, scutched Flax Fibre, both systems.
2. Unsteeped Flax Fibre from dried Straw.
3. Hackled Flax from both systems, and Hackled Tow.
4. Tow from both systems, and from the unsteeped process.
5. Tow in the forms to mix with Wool.
6. Flax, Hemp, &c., prepared as a substitute for Cotton and Silk.

B. Linen Yarn and Thread.
1. Linen Yarn, Thread, &c.: English, Scotch, and Irish (Tow and Linen Yarn, 1½ to 400 lea).
2. Hand-Spun Thread as used for some fine Cambrics, &c. (240 to 800 lea).
3. Dyed Yarns and Threads of various colours.
4. Dyed Yarns and Threads to resemble Lustre of Silk.
5. Flax-Cotton, Flax-Fibre, Flax-Wool, and Flax-Silk Yarns.
6. Flax Thread from unsteeped Fibre.

C. Plain Linens of all widths, Bleached, Unbleached, and Dyed.
1. Canvas—
    English, Scotch, Irish, French, Dutch, and Russian.
2. Heavy Linens—
    As Crash, Huckabacks, Glass Cloths, and Sheetings: Yorkshire, Newark, Scotch, Drogheda, Courtrai, Ghent, Russia. Tubing for Irrigation, and Banding for Machinery.
3. Irish Manufacture—
    Brown, Black, and coloured Linens.
4. Platillas, Creas, Britannias, German ditto ditto.
5. Irish Linens and Sheetings—
    Courtrai, Ghent, Bielefield, Prussian.

D. Damasks, Diapers, Drills, and other Twilled Linens: Bleached, Unbleached, or Dyed.
1. Damasks and Diapers—
    English, Scotch, Irish, Saxon.
2. Drills—
    English, Scotch, Irish, French, Saxon, Russian.
3. Linen Velveteens, Linen Velvets, and Linen Cords.

E. Cambrics, Cambric and Linen Handkerchiefs, Plain, Bordered, Embroidered, Plain Printed or Dyed; Printed Linens, Lawns, Cambrics, Bleached, Unbleached, or Dyed.
1. Irish.
2. French.
3. Irish, Scotch, and Swiss Embroidering (in Cambric).

F. Cordage of all kinds.
    Ropes, Lines, Twines, Nets, &c.

XV. *Mixed Fabrics, including Shawls; but exclusive of Worsted Goods.* (*Class XII.*)

A. Mixed Woven Fabrics.
1. Cotton Warp, plain, watered, or figured.
    Shot with Wool or Worsted.
    „ Mohair.
    „ Linen.
    „ Silk.
    „ Silk and Worsted.
    „ Silk and Cotton.
    „ China Grass.
    For Dresses, Damasks, Aprons, Shoe and Boot Cloths, Linings, Cravats, Vestings, Ponchos, Pantaloons, Shawls, Scarfs, Coatings, Tweeds, Quiltings, Plaids, &c.
2. Spun Silk Warp, plain, watered, or figured.
    Shot with Wool or Worsted.
    „ Mohair.
    „ Linen.
    „ Net Silk.
    „ Silk and Worsted.
    „ All Cotton.
    Dress[illegible]
3. Silk Warps, plain, watered, [illegible]
    Shot with Cotton.
    „ Wool or [illegible]
    „ Mo[illegible]
    „ [illegible]
    „ [illegible]
    „ [illegible]

4. **Linen Warps, plain, watered, or figured.**
    - Shot with Wool or Worsted.
    - „ Mohair.
    - „ Cotton and Silk.
    - „ Silk.
5. Cotton and Silk Warps, plain, watered, or figured.
    - Shot with Cotton.
    - „ Mohair.
    - „ Silk.
    - „ Worsted.
    - „ China Grass.
    - } For Dresses, Articles of Furniture, Shawls, &c.

B. SHAWLS.

1. Woven Shawls.
    - Chenille, all Silk or Silk and Cotton.
    - Cashmere from the East.
    - Imitation Cashmeres, that is, Harness or Jacquard Wove Shawls.
    - Plain Silk and Satin.
    - Figured Silk and Satin.
    - Crape, plain and embroidered.
    - Gauze, plain and figured.
    - Lace, plain and figured.
    - Shetland or knittted Woollen.
    - Barège, all Wool and Silk and Wool.
    - Grenadine and other thin texture, in Silk and Silk and Wool.
    - Embroidered Lace, Silk, and Cashmere.
    - Woollen, plain, tartan, and fancy.
2. Printed Shawls.
    - Barège.
    - Silk, including Silk, Grenadine, and other thin mixtures.
    - Cashmere.
    - Chiné, or Shawls printed on the warp before they are woven.

XVI. *Leather, including Saddlery and Harness, Skins, Fur, Feathers, and Hair.*

A. LEATHER.

1. Rough tanned Leather—
    - Tanned Butts.
    - „ Crop-hides.
    - „ Offal, *i. e.* Shoulders and Bellies.
    - „ Horse Butts.
    - „ Dressing-hides.
    - „ Horse-hides.
    - „ Kips.
    - „ Calf-skins.
    - „ Seal-skins.
    - „ Hog-skins.
    - „ Bazils.
    - „ Varieties.
2. Curried Leather—
    - Curried Calf-skin, Russet (*i. e.* Natural Colour).
    - „ „ Waxed (*i. e.* Black).
    - „ „ Butts, Russett.
    - „ „ Butts, Waxed.
    - „ Kips, Russett.
    - „ Kips, Waxed.
    - „ Cordovan, Waved.
    - „ Cordovan, Grain.
    - „ Shoe-hides.
    - „ Seal-skins.
    - „ Dog-skins.
    - „ Goat-skins.
    - „ Boot-legs.
    - „ Boot-fronts.
    - „ Varieties.
    - „ Saddlers' Hides.
    - „ Rein-hides.
    - „ Collar-hides.
    - „ Chaise-hides.
    - „ Pouch and Scabbard Hides.
    - „ Powder Hides.
    - „ Bellows Hides.
    - „ Pipe Backs.
    - „ Bag Hides.
    - „ Pig-skins.
    - „ Hog-skins.
    - „ Russia Leather
3. Enamelled Leather—
    - Black Enamelled Horse-hides.
    - „ Cow-hides.
    - „ Calf-skins.
    - „ Seal-skins.
    - „ Goat-skins.
    - „ Roans.
    - „ Skivers.
    - Coloured Enamelled Calf-skins.
    - „ Sheep-skins.
    - Black Japanned Horse-hides.
    - „ Cow-hides.
    - „ Calf-skins.
    - „ Sheep-skins.
    - Coloured Japanned Skins various.
4. Dyed Leather—
    - Dyed Morocco, *i. e.* (Goat-skins) for Furniture and Coach Purposes.
    - „ Roan, *i. e.* (Sheep-skins) for Furniture and Coach purposes.
    - „ Morocco, for Shoe purposes.
    - „ Roan ditto.
    - „ Roan ditto.
    - „ Morocco for Bookbinding and Pocketbooks, &c.
    - „ Roan for Bookbinding and Pocketbooks, &c.
    - „ Skiver ditto ditto.
    - „ Calf ditto ditto.
    - Striped Seal-skin for Shoe-binding, &c.
    - „ Cape Sheep-skins „
    - „ Sheep „ „
    - „ Goat „ „
    - „ Horse-hide „
5. Oil Leather—
    - Buck-skins, finished natural colour.
    - Doe „ „
    - Calf „ „
    - Lambs „ ,
    - Sheep „ „
    - Ox and Cow Hides „
    - Buck-skins, dyed or coloured.
    - Doe „ „
    - Calf „ „
    - Lamb „ „
    - Sheep „ „
6. White or Alum Leather—
    - Alumed Horse-hides.
    - „ Calf-skins.
    - „ Sheep-skins strained white.
    - „ Lamb-skins „
    - „ Lamb-skins coloured.
    - „ Kid-skins for Gloves, White
    - „ „ „ Dyed.
    - „ Lamb-skins „
    - „ Sheep-skins „
    - „ Kid-skins for Shoes.
    - „ Calf-skins „
    - „ Sheep-skins „
    - „ Varieties.
    - Gaiter Leather.
7. Sheep and Skin Rugs—
    - Sheep and Lamb, Brown Rugs.
    - „ Coloured.
    - „ White.
    - Sheep Rugs for Cavalry Saddles.
    - Angola Goat, Coloured.
    - „ White.
    - Various Wild Animal Skins for Rugs.
8. Parchment and Vellum.
    - Sheep-skin Parchment for Deeds.
    - „ „ Bookbinding, White.
    - „ „ „ Coloured.
    - Vellum for Bookbinding, White.
    - „ „ Coloured.
    - „ Painting.
    - „ Tambourines.
    - „ Drum-heads.
    - „ Gunpowder-sieves.

B. SADDLERY AND HARNESS.

1. Harness; Carriage, Gig, Cart.
2. Saddlery.
3. Whips.

C. MISCELLANEOUS.

1. Leather Manufactures, such as Bellows, &c.
2. Braces, Webbing-belts, &c.

D. **Skins and Fur.**

1. Sable and Martin—

Russian or Siberian Sable	As manufactured for Muffs, Tippets, Trimmings, Cuffs, &c.
Hudson's Bay Martin or Sable, next in repute and value	
The North American or Canadian	
Baum or Wood Martin, a native of the Forests of Germany, &c.	
Stone Martin, living in rocks, old ruined castles, buildings, &c.	
English Martin	
Dyed Sable and Martin	

2. Otter—

Nootka Sound, or Sea Otter	As used in China for Royal robes, and by the Russians, Chinese, Greeks and Persians, for Caps, &c.
Hudson's Bay and North American Otter	
European Otter	
Pull-dyed Otter	

3. Fox—

Hudson's Bay and North American Black and Silver Fox	As used abroad for Dresses, and in this country for Coat-linings, Carriage Wrappers, Ottomans, Foot-Muffs, &c.
Blue Fox	
White Fox	
Red Fox	
Cross Fox	
Grey Fox	
Kitt Fox	
European Red Fox	

4. Bear—

Black Bear of Hudson's Bay and North America	Army Clothing and Accoutrements, and for Hearth-rugs and Sleigh coverings.
Brown, or Isabella	
Grey "	
European Grey and Black Bear	
Polar or White Bear	

5. Beaver—

Beaver from Hudson's Bay and North America	As made into Muffs, Tippets, Cuffs, and other articles of Apparel.
Manufactured	
Dyed ditto	

6. Swan.

Swan Skin	For Boas, Trimmings, Puffs, &c.
Swansdown Skin	
Swan Feathers	
Swan Quills	

7. Goose.

Goose Skin	Used as Swansdown.
Goose Down.	

8. Mink.
North American and Hudson's Bay Mink; as used for Muffs, Tippets, Cuffs, &c.

9. Buffalo, for Sleigh Coverings, Open Carriages, and for Railway purposes.

10. Hudson's Bay and North American Skins.

Lynx	As used in America, when dyed, for Muffs and Tippets, and in the undyed state by the Chinese, Greeks, and Persians. The Raccoon as linings of Shakos and Coats in Russia and Germany.
Lynxcat	
Dyed Lynx	
Raccoon	
Wolf	
Fisher	
Wolverin	

11. Ermine or Weasel tribe.

Ermine	For general purposes of Ladies' Apparel.
Weasel	
Polecat or Fitch	
Russian Fitch	
Dyed Fitch	
Kolinski and Dyed Kolinski	
Kolrosk and Dyed Kolrosk	

12. Seal.

South Georgia, Shetland, and Falkland Isles	Men's Coats and Ladies' Dresses, Muffs, Capes, Cuffs, Caps, Waistcoats, Shoes, Boots, &c.
Lomar's Island and Cape	
The Plucked and Manufactured Seal	
Seal when dyed	
The Greenland and Newfoundland Hair Seals	
The Labrador Spotted and Silver Seal	
The same in its dyed state	

13. Musquash, or large North American Rat, for Ladies' wear, as for Muffs, Boas, &c.

Hamster	As for Muffs, Tippets, Linings, Cuffs, &c.
Opossum	
Perewiazka	

14. Hare and Rabbit.

White Hair from Russia and the Polar Regions	Muffs, Tippets, Linings, Cuffs, &c.
European or Grey Hare	
Hudson's Bay and North American Rabbit	
English Rabbit	
Flemish Rabbit	
Silver Grey Rabbit	
White Polish Rabbit	
Black and Blue Rabbit	
Australian Rabbit	
Dyed Rabbit	

15. Lamb, &c.

Grey Russian Crimea Lamb	For general purposes of Dress.
Black Ukraine Lamb	
Black Astrachan Lamb	
Persian Grey Lamb	
Persian Black Lamb	
Hungarian Lamb	
Spanish Lamb	
English Lamb	

16. Squirrel.

Black Russian	For Ladies' wear, and for Muffs, Tippets, Cuffs, Linings, Trimmings, &c.
Blue Siberian	
Kazan Siberian	
American Squirrel	
English Squirrel	
Indian Striped Squirrel	
Flying Squirrel	
Dyed Squirrel	

17. Chinchilla.

African Chinchilla	As made into various articles of Ladies' Dress.
Buenos Ayres Chinchilla	
Lima or bastard Chinchilla	

18. Cat.

Dutch Cat or Jennet	For Coat Linings, Sleigh Coverings, Travelling Bags, &c.
European Cat	
Wild Cat	
African Cat	

19. Grebe	For Ladies' use.
Eider Duck	
Penguin	
20. Tartar Foal	Various purposes.
Angora Goat	
Dyed Goat	

21. Skins from the Tropics.

Lion	
Royal Tiger	Mounted for Ornamental purposes and for Furniture.
Cape Tiger	
Leopard	
Panther	
Zebra	
Antelope	
Black Monkey	
Anteater	

22. Miscellaneous—Moose Deer.
Deer.
Roebuck.
Badger; the hair of the European badger, as used for shaving-brushes, &c.
Mole, as made into articles of Ladies' apparel.

E. **Feathers.**

1. Ostrich.

Aleppo	As worn in Plumes on Court occasions by Knights of various Orders, and for Military purposes, also in their application to general Dress for Ladies and for Funeral Plumes.
Magador	
Alexandria	
Senegal	
Cape	
Algoa Bay	
Dyed	

2. Marabouts.

Marabout Stork	As Plumes for Head Dresses, Bonnets, Trimmings for Dresses, Muffs, Tippets, and Fans, and as used with Gold, Silver, or Pearls.
Adjutant	
Paddy or Rice Bird	
White	
Grey	
Dyed	

3. Rhea.

Long Flossy	The Feathers known by the Plumassiers as "Vulture's," and used for Ladies' wear, made up into fanciful forms, and for military purposes, in America; the common sorts made into dusting-brooms.
Short Flossy	
Brown	

4. Osprey. Large Small Egrett	The Feathers of the small Egrett, as used for Ladies only. Those of the large Osprey for Ladies, and the Feathers of the back, as used for Military Plumes for the Hussar Regiments.
5. Emu	The Feathers varying in shades, as used in their natural colour for Ladies' Bonnets, and dyed darker colours and black.
6. Birds of Paradise. The Large Emerald The Small Emerald The King Bird	The Birds, as worn by persons of rank in the East, also by Ladies in Europe and America, arranged as a Bird.
7. Heron. The Heron The White-bellied Darter	The Feathers of the head and breast of the *Andrea cinerea*, as used for Ladies, and by Knights at their installation. Those from the back of the *Plotus anhinga*, as used in England by Ladies, and in the Eastern Countries by Princes and persons of Rank.
8. Ibis.	The Feathers of their natural scarlet colour, as made into Wreaths for the Head.
Swan	For Ladies' Bonnets and Military Plumes.
Turkey	The Down of these Birds as used for Ladies' Plumes and Trimmings.
Cock	The Feathers of the neck, back, and tail made into Plumes for Ladies' and Children's Hats and Military Plumes.
Peacocks	For Plumes and Screens.
Argus Pheasant	The Feathers marked with eyes, as used, the small for Plumes, the large for Tiaras for the head.
Common Pheasant.	Made into Trimming.
Eagle.	The Feathers forming the wing of this Bird as used for the Highland Bonnet.
9. Miscellaneous	The Feathers of the Jay, Duck, Grebe, and Tucan, as also several Birds from the Tropics, in their applications to Ladies' dresses.

F. HAIR.

1. Hair as a substitute for Human Hair, as Wigs, Curls, Fronts, &c.
2. Ornaments in Hair, as Plumes, Bracelets, Guards, &c. (See also XXIII. C.)
3. Hair Cloth for the purposes of Furniture.
4. Hair for miscellaneous purposes, as for stuffing Furniture.

XVII. *Paper and Stationery, Printing, and Bookbinding.*

A. PAPER IN THE RAW STATE AS IT LEAVES THE MILL.

1. Brown Paper and Packing Papers.
2. Millboards and Glazed Boards for pressing.
3. Printing Papers.
4. Drawing Papers.
5. Writing Papers.
6. Tissue Papers, white and tinted.
7. Papers tinted in the Pulp.
8. Tracing Papers, made so in the Pulp.
9. Papers ornamented in the Water-mark.
10. Cartridge Paper.

B. ARTICLES OF STATIONERY.

1. Envelopes, plain and ornamental.
2. Embossed and Lace Papers.
3. Printed Fancy Papers and Surface-coloured Papers, Printed and Embossed Ornaments.
4. Wedding Stationery (Cards, Papers, and Envelopes).
5. Mourning Stationery (Cards, Papers, and Envelopes).
6. Specimens of Ornamenting, Glazing, and Packeting Writing Papers.
7. Sealing-wax and Wafers.
8. Pens.
9. Small Wares for Stationery.
10. Tracing Paper, made transparent by Varnishes.
11. Inks of all kinds.

C. PASTEBOARDS, CARDS, &c.

1. Playing Cards.
2. Message Cards, plain and ornamental.
3. Drawing Boards.
4. Mounting Board, plain and ornamental.
5. Pasteboard and Cardboard.

D. PAPER AND SCALEBOARD BOXES, CARTONS (CARTONNERIE).

All kinds of Boxes and Cases made of Pasteboard and Paper (not being Papier-maché), plain or ornamented.

E. PRINTING (NOT INCLUDING FINE ART PRINTING).

1. Type-printing generally.
2. Printing Inks and Varnishes.

F. BOOKBINDING, &c.

1. Binding in Cloth.
2. " Vellum.
3. " Leather.
4. " Velvet.
5. " Wood, Papier-maché, or Metal.
6. Albums, Scrap-books, Portfolios, Music-books, Manuscript-books, Memorandum-books.
7. Ledgers and Account-books.
8. Blotting-cases, Desks, Cabinets, Pocket-books, Card-cases, Note-cases, &c.
9. Porte-monnaie, and other Articles of a similar nature.

XVIII. *Woven, Spun, Felted, and Laid Fabrics, when shown as specimens of Printing or Dyeing.*

A. PRINTING OR DYEING OF WOOLLENS, OR ANY MOUSSELINE DE SOIE, DE LAINE, OR ALPACA MIXTURE.

1. Mousseline de Laine, de Soie, &c.—
   Made of all Wool.
   " Cotton and Wool.
   Cashmere—
   Made of all Wood.
   " Cotton and Wool.
   Barège—
   Made of Silk and Wool.
   " Cotton and Wool.
   " all Wool.
   " Cotton, Silk, and Wool.
   Balzarine, plain and figured—
   Made of Cotton and Wool.
   " Silk and Wool.
   " Cotton, Silk, and Wool.
2. Printed or Dyed Cotton or Silk Warps, afterwards woven, known as Chiné.
3. Printed Woollen Table-covers.
   " " Japanned.
4. Printed and Dyed Silks—
   India Corahs in the Grey.
   " dyed.
   " printed in England.
   India Bandanas (tied and dyed in India).
   " Choppahs (printed in India).
   British Corahs in the Grey.
   " dyed.
   " printed.
   British Twills in the Grey.
   " dyed.
   " printed.
   British Spun Silks, printed.
   British Cambrics, printed.
   " dyed.
   British Spun Silk Dresses, dyed.
   " " printed.
   British Corah Dresses, printed.
   India Corah Dresses, printed.
   Printed China Crape Shawls.

B. PRINTED CALICOES, CAMBRICS, MUSLINS, VELVET, AND VELVETEENS—

1. Cottons printed by Machines only.
   „ by Block only.
   „ partly by Block and Machinery.
   Turkey-red, printed or dyed.
   „ „ Mules.
   Muslins printed by Machinery.
   „ by Block only.
   „ partly by Block and Machinery.
   Prints and Furniture by Machine only.
   „ by Block only.
   „ partly Block and Machine.
2. Handkerchiefs for the pocket, head, neck, and shoulders.
   Single Colours, blue ground, &c.
   Assorted Colours, fast and loose.
   Turkey-red, Bandanas printed.
   „ „ discharged.
   „ Chintz pattern.
   Printed Border Handkerchiefs.
   Imitation Cambric.
   „ Fancy Muslin.
   Imitation Java batticked Handkerchiefs.
   Printed Aprons.
3. Printed Shawls and Dresses.
   Shawls, assorted Colours . . { part with fringe,
   „ Turkey-red, or purple { part without.
   Java Sarongs batticked.
   „ Turkey-red.
   Java Slendrongs, Turkey-red, and batticked.
   Malay Chindey or Imitation.
   Bombay Patolio.
   Siam Shawls.
   Scarfs.
   Dresses.

B. DYED COTTON GOODS.

Cambrics and Madapolones, assorted Colours.
„ Turkey-red.
Imitation blue Morries and Bassias.
Long Cloths of all kinds.
Mull and Book Muslin of all kinds.
Cotton Drills (blue).
Velvet.
Velveteens.

D. DYED LINEN GOODS.

Printed Linens.
Cambric Handkerchiefs.
Lawn Shirt Fronts.
Lawn Hankerchiefs.

E. DYEING OR PRINTING OF LEATHER, HAIR, FUR, ETC.

XIX. *Tapestry, including Carpets and Floor-cloths, Lace, Embroidery, Fancy and Industrial Work.*

A. TAPESTRY.

1. Carpets of all kinds in which the Pattern is produced by Weaving or by the Hand, in the manner of Tapestry proper, including Hall Carpets, Rugs, Stair, &c.
   a. Axminster Carpets, Flax or Jute, Chain, Woollen, or Worsted Pile, worked by hand.
   b. Table and Chair Covers, &c., worked in the same way.
   c. Patent Axminster Carpets, manufactured at Glasgow, made firstly as a woven Fringe, and that adapted afterwards to a thick Flax surface.
   d. Patent Tapestry Carpet, Pattern printed in warp, any number of Colours used; Table-covers and Curtains, made in same way.
   e. Patent Tapestry Rugs, Velvet Pile Surface, with a thick weft shoot of Cotton, Flax, or other material.
   f. Brussells and Velvet Pile Carpet.
   g. Tapestry Brussells Carpets, called Moquette, of a fine quality.
   h. Kidderminster and Venetian Carpet.
   i. Patent Mosaic Tapestry and Rugs, where the cut Wool is fixed to a ground by caoutchouc, &c.
   j. Printed Felt Carpet, Plain and Printed Druggets, Printed and Embossed Cloth for Table-covers and Curtains.
   k. Patent Printed Carpets with Terry Pile Surface; the same Moquette for Curtains or Furniture.
   l. Cloth Embroidered by Machinery for Table-covers or Curtains.
2. Matting of Hemp, Cocoa-nut Fibre, Straw, Reeds, and Grasses, for Floor and Walls.
3. Oil-cloth for Floor or Table, whether painted or printed.
4. Woven or Embroidery, Crochet and Net Work.
5. Counterpanes and Quilts for Bed-covers; Quilting and Dimity for Bed-room Hanging.
6. Ornamental Tapestry of Silk, Wool, Linen, Mohair, Cotton, or of these Materials mingled together, or with Metal Wires, whether woven in the Loom or of any kind of Needlework, but of Patterns having so much artistic excellence as to entitle them to be exhibited in Section XXX. as Works of fine Art.

B. LACE.

1. Pillow Lace, the article or fabric being wholly made by hand (known as Valenciennes, Mechlin, Honiton, Buckingham); or guipure made by the Crochet Needle; and Silk Lace, called "Blonde" when white, and Chantilly, Puy, Grammont, and Black Buckinghamshire when black.
2. Lace, the ground being Machine-wrought, the Ornamentation made on the Pillow and afterwards applied to the Ground (known as Brussells, Honiton, or appliquée Lace.)
3. Machine-made Nets and Quillings, wholly Plain, whether Warp or Bobbin (known as Bobbin Net, Tulles, Blondes, Cambraic, Mechlins, Malines, Brussells, Alençon, &c.).
4. Lace, the Ground being wholly made by Machine; partly Ornamented by Machine and partly by Hand, or wholly Ornamented by Hand, whether Tamboured, Needle-Embroidered, or Darned.
5. Lace actually Wrought and Ornamented by Machinery; comprising Trimming Laces of every description, Veils, Falls, Scarfs, Shawls, Lappets, Curtains, &c.

C. SEWED AND TAMBOURED MUSLINS.

Ladies' Collars, Cuffs, &c.
Children's Robes.
Handkerchiefs.
Trimmings and Insertions.
Vest Pieces.
Shirt Fronts.
Mantles.
Dresses.
Curtains, &c.

D. EMBROIDERY.

1. Gold and Silver and Glass.
2. Silk, as Shawls, Dresses, Mantles, Table Covers, and Curtains, &c.
3. Berlin Wool, Chair Covers and Fancy Articles for the Drawing-room.
4. Embroidery by Machinery.

E. FRINGES, &c.

1. Fringes, Tassels, Gymps, &c., suitable as Trimmings for Upholstery.
2. Ditto for Dresses and other fine Work.

F. FANCY AND INDUSTRIAL WORKS.

1. Berlin Wool Work.
2. Needlework.
3. Miscellaneous Industrial Works.

XX. *Articles of Clothing for Immediate Personal or Domestic Use.*

A. HATS, CAPS, AND BONNETS.

1. Hats, made of Silk, Beaver, or other materials, for Men.
2. Caps, for Men.
3. Bonnets of Straw, Silk, or other material.
   a. British Chip Bonnet made from the Poplar.
   b. Willow Bonnet.
   c. Brazilian Grass Hats.
   d. Tuscan and Leghorn Plaiting and Bonnets.
   e. Straw Plait Bonnets.
   f. Straw Trimmings and Bonnets.
   g. Horse-hair Trimmings and Bonnets.
   h. Silk and other Bonnets made by Milliners.

B. HOSIERY.
  1. Cotton.
  2. Woollen.
  3. Linen.
  4. Silk.

C. GLOVES.
  1. Made of Leather or Skins.
  2. Made of any other materials.

D. BOOTS, SHOES, AND LASTS.
  1. Made of Leather.
  2. Made of other materials.

E. UNDER CLOTHING.
  1. For Ladies.
  2. For Gentlemen.

F. UPPER CLOTHING
  1. For Ladies, including all kinds of Millinery.
  2. For Gentlemen, including all kinds of Tailor's-work.

XXI. *Cutlery and Edge-tools.*

A. CUTLERY, SUCH AS KNIVES AND FORKS, PEN AND POCKET KNIVES, RAZORS, SCISSORS, AND SHEARS.
  1. Knives and Forks—
    Table, Dessert, Carving.
    Dessert or Fruit, with plated and silver blades.
    Cake and Melon Carvers, „ „
    Fish Knives and Forks, „ „
  2. Spring Knives—
    Pen and Pocket Knives of every description.
    Hunting and Sportsmen's Knives.
  3. Knives of all other descriptions—
    Paper Knives of all kinds.
    Desk or Office Knives.
    Palette Knives.
    Knives for Hunting and Self-defence, as Couteaux-de-Chasse, Bowie Knives, &c.
    Knives for Kitchen and Domestic Purposes, as Cooks', Oyster, Onion, Bread and Butter, and Cheese Knives.
    Knives used in various Trades, as Butchers', Shoemakers', Glaziers', Gardeners', &c.
  4. Scissors and Shears—
    Ladies' Work and Cutting-out Scissors of every description.
    Nail, Button-hole, Barbers', and Trimming Scissors.
    Shears used in various Trades, as Tailors', Brushmakers', &c.
    Garden and Sheep Shears.
  5. Razors of all kinds.
  6. Miscellaneous—
    Corkscrews, Button-hooks, Boot-hooks, Nail-nippers, Nail-files, Tweezers, &c.

B. FILES AND OTHER SMALL EDGE TOOLS, NOT INCLUDED IN MANUFACTURING TOOLS IN SECTION VI.
  1. Files and Edge-tools used by Engineers, Smiths, or other Metal Workers.
  2. „ for purposes of Building, by Masons, Bricklayers, and Plasterers.
  3. „ for fine Metal and other work, as for Clock and Watch makers, Jewellers, Lapidaries, Engravers, and Modellers.
  4. „ for Wood-work, as for Carpenters, Joiners, Cabinet-makers, Coopers, &c.
  5. „ for Leather or Skins, as for Saddlers, Curriers, Shoemakers, and Bookbinders.
  6. Drawing, Artists', and Engraving Instruments.
  7. Files and Edge-tools for other purposes than those specified.

XXII. *Iron and General Hardware.*

A. BRASS MANUFACTURE.
  1. Cabinet and general Brass Foundry, consisting of Hinges, Fastenings, Escutcheons, Bell-pulls, Brass-foundry used in Ships, Knockers, Door-springs, Castors, &c.
  2. Plumbers' Brass Foundry, Cocks, Valves, Pumps, Water-closets, &c.
  3. Stamped Brass Foundry, Cornices, Curtain-bands, Finger-plates, &c.
  4. Gas-fittings, Brackets, Chandeliers, Pillars, Gas Burners, and Consumers' Meters, &c.
  5. Tubing, plain and ornamental.
  6. Metallic Bedsteads, Brass and Iron.
  7. Chandeliers, Lamps, and Candelabra, for Oil, Candles, or Camphine, and Lamp Chains.
  8. Railway and Carriage Brass Foundry, and Signal Lamps and Lanterns.
  9. Bronze Figures, Busts, and Chimney Ornaments.
  10. Bells, House, Church, Ship, Table, &c., and Alarums.
  11. Candlesticks, Table and Bedroom.
  12. Monumental Brasses and Ecclesiastical Brass-work.
  13. Copper and Steel Plates for Engravers.
  14. Miscellaneous.

B. COPPER, ZINC, TIN, PEWTER, AND GENERAL BRAZIERY.
  1. Kettles, Coalscuttles, Coppers, Saucepans, Steamers, Plate-warmers, &c.
  2. Bronzed Tea and Coffee Urns, Kettles, &c.
  3. Tubing—Copper, Tin, Lead, &c.
  4. Pewter, German Silver, and Britannia-metal Teapots, Basins, Dishes, Spoons, Ladles, Inkstands, &c.
  5. Coffin Furniture—Plates, Escutcheons, &c.
  6. Zinc Articles generally.

C. IRON MANUFACTURE. (See also I. and V.)
  1. Stoves, Grates, Fenders and Fire Irons, Kitchen Ranges, Cooking Apparatus, Smoke-jacks.
  2. Warming Apparatus, for Halls and Rooms, Ships, &c., either by Water, Coal, Coke, Wood, Charcoal, or Gas.
  3. Shower, Vapour, Air, and Warm-water Baths.
  4. Ventilators—Metallic and others.
  5. Pipes and Gutters, &c.
  6. Locks and Hinges.
  7. General Ironmongery.
  8. Ice Machines.
  9. Knife-cleaning Machines.
  10. Letter-copying Machines and Presses.
  11. Saddlers' Ironmongery.
  12. Hollow Ware, cast and wrought, tinned and enamelled.
  13. Spades, Shovels, Pickaxes, Hoes, Rakes, Garden-rollers, &c. (See also S. IX.)
  14. Nails, cut, cast, and wrought, in Iron, Copper, and other Metals.
  15. Screws and Railway Bolts, &c.
  16. Iron Safes, Cash-boxes, fire-proof and otherwise.
  17. Horse-shoes.
  18. Gates, Railings, Hurdles, and Stable Fittings.
  19. Mangles, Washing Machines, &c.

D. STEEL MANUFACTURE.
  1. Tools and heavy Steel Toys, Hammers, Vices, &c.
  2. Steel Ornaments, and light fancy Steel Toys, Brooches, Buckles, &c.
  3. Steel Pens and Metallic Pens.
  4. Needles, Fish-hooks, and Fishing Tackle.

E. BUTTONS, ETC.
  1. Buttons—Metallic, Florentine, Pearl, Bone, &c.
  2 Metal Boxes, Watch Boxes, &c.

F. WIRE WORK, &c.
  1. Wire Gauze, for Window Blinds, Fencing, Pheasantry, Birdcages, &c.
  2. Wire—Iron, Brass, Steel, and Copper.
  3. Pins—white and black.
  4. Hooks and Eyes.
  5. Metallic Wire Baskets.
  6. Wire Rope.

XXIII. *Working in Precious Metals and in their imitations; Jewellery, and all Articles of Virtu and Luxury not included in the other Classes.*

A. COMMUNION SERVICES.
    As Altar-dishes, Flagons, Chalices, Patens, Plates, &c.

B. ARTICLES OF GOLD AND SILVER PLATE, FOR DECORATIVE PURPOSES AND PRESENTATION PIECES.
  1. Racing Prizes, Testimonials, allegorical, historical, and emblematic Groups and Compositions, Shields, Centre Pieces, Vases, Tazzas, Ewers, Salvers, Candelabra, &c.
  2. The same Articles made in hammered or repoussé metal.

C. Smaller Articles for more General Domestic Use.

1. For the Dinner Table; as Smaller Candelabra with branches, Candlesticks, Centre Pieces, Soup and Sauce Tureens, Covered Dishes, Smaller Mounted Dishes, Flat Dishes, Flower-stands and Epergnes, Dessert Services, Table and Dessert Knives, Spoons, and Forks, Salvers, Bread and Cake Baskets, Claret Jugs, Wine Coasters, Cruet Frames, Mustard Pots, Salts, &c.
2. Breakfast and Tea-table Service; as Tea and Coffee Urns and Kettles, Tea and Coffee Pots and Stands, Sugar Basins, Milk and Cream Jugs, Ewers and Basins, Toast Racks, &c.
3. Dressing and Library Table and Travelling Utensils; as Inkstands and Writing Appendages, Dressing Cases and Instruments, &c.
4. Miscellaneous; as Watch and Clock Cases, Toys, Pencil Cases, Seals and Keys, Filagree Baskets and Ornaments.

D. Electro-plated Goods of all descriptions, comprehending all that can be executed in Silver and other Metals.

E. Sheffield and other Plated Goods.

Centre and Side covered Dishes and Warmers, Soup Tureens, Cruet Frames, Liqueur Frames, Pickle ditto, Candlesticks and Branches, Candelabra, Bread and Cake Baskets, Snuffers and Trays, Tea and Coffee Services, Teatrays, Hand Waiters, Claret Jugs, Decanter Stands, Sugar Stands, Flower Stands, Nut Crackers, Grape Scissors, Mustard Pots, &c.

F. Gilt and Or-molu Work.

1. Gilt by the Electro process.
2. Gilt by amalgamation, or "Water Gilding."
3. Imitation Jewellery and Toys.

G. Jewellery.

1. Works exhibiting the Precious Stones and Pearls, as Diamonds, Rubies, Sapphires, Emeralds, Opals, Turquois; and the manner of setting them in Crowns, Coronets, Stars, Orders, Tiaras, Head Ornaments, Bouquets, Necklaces, Bracelets and Armlets, Presentation Snuff Boxes, Brooches, Ear Pendants, Medallions, Studs, and Buttons.
2. Ornaments similar to those of the former class, in which are exhibited the setting of the inferior Stones, Amethysts, Topazes, Carbuncles, Aquamarines, Jacinths, Crysophrases, Carnelians, Onyxes, whether plain or set, Cameos or Intaglios, Engraved Shells, &c. &c.
3. Ornaments made of Gold, whether plain or enamelled; as Bracelets, Brooches, Necklaces, Earrings, Pins, Waist-Buckles, Chains, Buckles, Studs, Chatelaines, &c. &c. &c.
4. Jewellery by imitations of Precious and other Stones.
5. Ornaments worked in Ivory, Jet, Horn, Hair, and other materials, of which the Precious Stones or Metals do not form the principal feature.

H. Ornaments and Toys worked in Iron, Steel, and other Metals which are neither Precious Metals nor Imitations of them, as Chatelaines of Steel, Chains of Steel, Sword-hilts, Cut Steel Shoe and Knee Buckles, Berlin Iron Ornaments, Chains, Necklaces, Bracelets, etc.

I. Enamelling and Damascene Work.

1. Enamelling of subjects on Gold and Precious Metals. (Except when shown in the Section of Fine Arts.)
2. Damascene Work, or insertion of one Metal in another, not included in the above-named Classes, as forming a minor ingredient in some more important species of Manufactures.

J. Articles of Use or Curiosity not included in the previous Enumeration.

XXIV. *Glass.*

A. Window Glass, including Sheet Glass, Crown Glass, and Coloured Sheet Glass.

1. Crown.
2. Sheet.
3. Blown Plate Glass, silvered and unsilvered.
4. Coloured Sheet, Pot Metal, or flashed.
5. Glass Ventilators.
6. Glass Shades, round, oval, and square.

B. Painted and other kinds of Ornamented Window Glass.

1. Enamelled, Embossed, Etched, painted white, or coloured Window Glass.
2. Painted and Leaded Windows.

C. Cast Plate Glass.

1. Rough Plate.
2. Ground and polished, silvered and unsilvered.
3. Pressed Plate.
4. Rolled Plate, white and coloured.

D. Bottle-Glass.

1. Ordinary Bottle-glass, including Moulded Bottles.
2. Medicinal Bottle-glass, including Phials, &c., blown and moulded, of all kinds and shapes.
3. White Bottle-glass, Blown, Pressed, and Moulded Bottles.
4. Water-pipes and Tubing.

E. Glass for Chemical and Philosophical Apparatus.

1. Glass for Matras, Retorts, and other kinds of Chemical and Philosophical Apparatus.
2. Water-pipes and Tubing.

F. Flint Glass or Crystal, with or without Lead, white, coloured, and ornamented, for Table Vases, etc.

1. Blown.
2. Moulded and Pressed.
3. Cut and Engraved.
4. Reticulated and spun with a variety of colours, incrusted, flashed, enamelled of all colours, opalescent, imitation of Alabaster, gilt, platinised, silvered, &c.
5. Glass Mosaic, Millefiori, Aventurine, and Venetian Glass Weights, &c.
6. Beads, imitation Pearls, &c.
7. Chandeliers, Candlesticks, and all Glass Apparatus for Lamps, Candlesticks, Girandoles, Wall Brackets, with or without drops, &c.

G. Optical Glass, Flint and Crown.

1. Rough Discs of Flint and Crown, to make Lenses for Telescopes, Microscopes, Daguerreotype and Calotype Apparatus, &c.
2. Flint and Crown, blown or cast in plates for the Optician.
3. Thin Glass for Microscopes.
4. Refractive Apparatus, Prismatic Lenses for Lighthouses. (See also Class J.)

XXV. *Ceramic Manufactures,—Porcelain, Earthenware, &c.*

A. Porcelain, Hard.

1. Chinese.
2. Japanese.
3. Continental, as Berlin, Meissen, &c.

B. Statuary Porcelain.

1. Statuary.
2. Parian.
3. Carrara.

C. Tender Porcelain.

1. English Porcelain, soft or tender.
2. French, with Siliceous body.

D. Stoneware, Glazed and Unglazed.

1. Ironstone, or Stone China, glazed.
2. White Stone body, unglazed.
3. Coloured body, Jasper. „
4. „ Egyptian black, unglazed.
5. „ Red, „
6. „ Cane, „
7. „ Drab, „
8. Brownware, with salt glaze. (The Lambeth, Chesterfield, and Beauvais manufactures are included in this class.)
9. Chemical utensils. (These are made both in Stoneware and Hard Porcelain).

E. Earthenware.

1. White body for Printing, Painting, or Enamelling in different Colours.
2. Common Cream-colour.
3. Green glazed ware.
4. Rockingham „

5. Delf ware.
6. Majolica ware.
7. Mocha and Dipped ware.
8. Common Lead glazed ditto, for utensils.
9. Coloured body, Turquoise.
10. " Drab.
11. " Olive.
12. " Buff.
13. " Cottage brown.

F. Terra Cotta.

1. Vases and Garden-pots.
2. Ornaments for Architecture.
3. Encaustic or Inlaid Tiles.
4. Tesseræ of various colours, compressed from powdered clay.
5. Superior Plain Tiles for Pavements, ditto ditto.
6. " Bricks, ditto, ditto.
7. " Roofing Tiles, ditto, ditto.
8. Chimney Pipes.
9. Common Bricks.
10. " Roofing Tiles, &c.

G. Ornamented or Decorated.

1. Ornamented on *Bisque*—
    Painted by hand.
    Printed and transferred in various colours.
2. Ornamented *on the glaze.*
    Painted by hand.
    Printed by the press.
    Printed by hand.
    Gold Lustre.
    Silver "
    Steel "
    Enamelling in various colours.
    Gilding.

H. Productions for Architectural Purposes.

XXVI. *Decoration Furniture and Upholstery, including Paper-hangings, Papier-maché, and Japanned Goods.*

A. Decoration generally, including Ecclesiastical Decoration.

1. Ecclesiastical Decoration generally.
2. Ornamental coloured Decoration, as executed by hand.
3. Imitations of Woods, Marbles, &c., executed by hand.
4. Relievo Decoration, mechanically produced.

B. Furniture and Upholstery.

1. Cabinet Work, plain.
2. Cabinet Work, carved or ornamental.
3. Marqueterie, inlaid Work, in Woods, &c.
4. Buhl or Metallic inlaid Work.
5. Chairs, Sofas, and Beds, and general Upholstery.

C. Paper-Hangings.

1. Damask Patterns.
2. Flower Patterns.
3. Flock and Metal Papers.
4. Decorative Paper-hangings by Block-work.
5. " " by any other Process.
6. Machine-printed Paper-hangings.

D. Papier-mache, Japanned Goods, Pearl, and Tortoiseshell Work.

1. Papier-maché, japanned, inlaid, and decorated.
2. Papier-mache (not japanned), produced in ornamental forms for decoration.
3. Japanned Goods in Iron, &c.
4. Pearl and Tortoiseshell Work.

XXVI. *Manufactures in Mineral Substances used for Building or Decoration, as in Marble, Slate, Porphyries, Cements, Artificial Stones, &c.*

A Manufactures in common Stones.

1. For Building, and constructions not strictly decorative.
2. For Decorative purposes.

B. Manufactures in Slate.

1. For Construction.
2. For Decoration.

C. Manufactures in Cement and Artificial Stone.

D. Manufactures in Marbles, Granites, Porphyries, Alabaster, Spar, etc., for useful or ornamental Purposes.

1. For Construction and external Decoration.
2. For internal Decoration (not Furniture), as Chimney-pieces, &c.
3. For articles of Furniture, as Tables, &c.
4. For purposes of mere Ornament.

E. Inlaid Work in Stone, Marble, and other Mineral Substances.

F. Ornamental Work in Plaster, Composition, Scagliola, Imitation Marble, etc.

G. Combinations of Iron and other Metals with Glass and other Substances for various useful purposes.

1. For Architectural purposes.
2. For Miscellaneous purposes.

XXVIII. *Manufactures from Animal and Vegetable Substances, not being Woven, Felted, or included in other Sections.*

A. Manufactures from Caoutchouc.

1. Impermeable Articles.
    Boots.
    Holdsworth's Life Preservers.
    Captain Smith's "
    Hydrostatic Beds.
    Air "
    Water Cushions.
    Air "
    Gas Bags.
    Printers' Blankets.
    Cloaks, Capes, Coats, Paletots, &c.
    Boots and Shoes.
    Over Shoes, or Goloshes.
    Fishing Boots.
    Deck "
    Ship Sheets.
    Bellows.
    Air-pump Valves for Steam Engines.
    Sponge Baths and Bags.
    Prepared Water and Air proof Textures of every description.
2. Elastic Articles.
    Railway and other Carriage Springs.
    " Buffers.
    Valve Canvas.
    Knee Caps.
    Surgical Bottles.
    Pump Buckets and Valves.
    Bands and Rings for Letters and Packages.
    Writing Tablets.
    Trouser Straps.
    Gussets for Boots.
    Vest Backs.
    Washers for Flange and Socket Joints.
    Driving Bands for Machinery.
    Railway Felt.
    Wheel Tires.
    E. Smith's Torsion Springs for Window-blinds and Shades.
    Door Springs.
    Dr. Bell's Sewer and Sink Valves
    Hodge's Projectile and Lifting Straps.
    Air-pump Valves.
    Elastic Webbing.
    Cricket Gloves and Balls.
    Stoppers for Decanters, Bottles, Jars, and other vessels.
3. Articles in Caoutchouc—Moulded, Embossed, Coloured, and Printed.
    Bas-reliefs.
    Bags.
    Maps, printed on Caoutchouc.
    Sheets, in Colour.
    Embossed and Printed Ornaments.
    Garters, Bracelets, &c., Embossed, Coloured, or Printed.
    Bottles, Embossed and in Colours.
    Embossed Sheets for Seats and other Purposes.
    Vulcanized Articles combined with Metal—such as Decanter Stoppers, Inkstands, Cocks and Taps for Fluids, Hinges, Locks and Bolts, Wheel Tires, Plugs for Cisterns, Linings of Vessels, &c.

B. Manufactures from Gutta Percha.
  1. For Waterproofing Purposes.
  2. For Agricultural Uses, as Tubing for Manure, &c.
  3. For Maritime Purposes, as Speaking Trumpets, Life Buoys, Life Boats, Cords, Tiller Ropes, &c.
  4. Decorative Uses, as Ornamental Mouldings, Brackets, Medallions, Picture Frames, &c.
  5. Surgical, Electrical, and Chemical Uses, as Dissolved Gutta Percha for Wounds, Stethoscopes, Splints, Ear Trumpets, &c., Carboys, Funnels, Acid Vessels, &c., Covering of Telegraph Wire, Insulating Stools, &c.
  6. Domestic and Miscellaneous Uses, as Soles for Shoes, Linings of Cisterns, Conveyance of Water and Gas, Hearing Apparatus, &c.

C. Manufactures from Ivory, Tortoiseshell, Shells, Bone, Horn, Bristles, and Vegetable Ivory.

D. General Manufactures from Wood (not being Furniture).
  1. Turnery.
  2. Carving, &c.
  3. Coopers' Work of all kinds.
  4. Basket and Wicker work.
  5. Miscellaneous Wood work.

E. Manufactures from Straw, Grass, and other similar Materials.

F. Miscellaneous Manufactures from Animal and Vegetable Substances.

XXIX. *Miscellaneous Manufactures and Small Wares.*

A. Perfumery and Soap.

B. Articles for Personal Use, as Writing Desks, Dressing Cases, Workboxes, when not exhibited in connexion with Precious Metals (XXIII.), and Travelling Gear generally.

C. Artificial Flowers.

D. Candles, and other means of giving Light.

E. Confectionery of all kinds.

F. Beads and Toys, when not of Hardware, Fans, etc.

G. Umbrellas, Parasols, Walking-sticks, etc.

H. Fishing Tackle of all kinds, Archery.

I. Games of all kinds.

J. Taxidermy.

K. Other Miscellaneous Manufactures.

FINE ARTS

(*So far as they come within the limitations of the Exhibition*).

XXX. *Sculpture, Models, and Plastic Art.*

A. Sculpture as a Fine Art.
  1. In Metals simple, as Gold, Silver, Copper, Iron, Zinc, Lead, &c.
  2. In Metals compound, as Bronze, Electrum, &c.
  3. In Minerals simple, as Marble, Stone, Gems, Clay, &c.
  4. In elaborate Mineral Materials, as Glass, Porcelain, &c.
  5. In Woods and other Vegetable Substances.
  6. In Animal Substances, as Ivory, Bone, Shells, Shell Cameos.

B. Works in Die-sinking, Intaglios.
  1. Coins, Medals, and Models of a Medallic character in any material.
  2. Impressions struck from Dies for ornamental purposes.
  3. Gems, either in Cameo or in Intaglio, Shell Cameos.
  4. Seals, &c.

C. Architectural Decorations.
  1. Integral, in Relief, Colour, &c.
  2. Adventitious, as Stained Glass, Tapestry, &c.

D. Mosaics and Inlaid Works.
  1. In Stone.
  2. In Tiles.
  3. In Vitrified Materials.
  4. In Wood.
  5. In Metal.

E. Enamels.
  1. On Metals.
  2. On China.
  3. On Glass.

F. Materials and Processes applicable to the Fine Arts generally, including Fine Art Printing, Printing in Colour, etc. etc.
  1. Encaustic Painting and Fresco.
  2. Ornamental Printing, Chromo-typography, Gold-Illuminated Typography, Typography combined or uncombined with Embossing.
  3. Lithography, Black, Chromo-lithography, Gold-Illuminated Lithography, Lithography combined or uncombined with Embossing.
  4. Zincography or other modes of Printing.

G. Models.
  1. In Architecture.
  2. Topography.
  3. Anatomy.

LYON PLAYFAIR.

OFFICIAL

DESCRIPTIVE AND ILLUSTRATED

CATALOGUE.

OUTLINE OF CONTENTS OF THE BUILDING.

The Building lies east and west, and is intersected by the Transept running north and south.

The Transept being taken as a point of departure, the building is divisible into two portions.

1. The western half is appropriated to the productions of the United Kingdom, India, and the Colonies.
2. The eastern half to Foreign Countries.

CONTENTS OF TRANSEPT.

Ornamental iron gates, various objects of sculpture, large glass fountain, other fountains, and ornamental gates. The Refreshment Court is at the north extremity. The offices of the Royal Commissioners and the Executive are at the southern entrance.

WESTERN HALF,—*Ground Floor.*

Proceeding towards the west along the nave, or central avenue, are placed a statue of the Duke of Rutland, the Spitalfields trophy, the horse and dragon, Canadian timber, marble dog, specimens of stone carving, console table and glass, specimens of crystallization, cross in Caen stone, &c., altar screen, Eldon and Stowell group, Honduras timber, church clock, Elizabethan fountains, models, patent lighthouse, filtering apparatus, sculpture, Coalbrook Dale glass-house, equatorial telescope, Liverpool model, fountain, and lighthouse.

SOUTHERN HALF.

The Avenues, M, N, O, and part of P, proceeding from the west, contain successively printed fabrics of Manchester, London, and Glasgow; flax manufactures of Ireland; woollen and mixed fabrics, the productions of Sheffield; furniture; the hardwares of Birmingham; the Mediæval court; Australian, Canadian, and East Indian productions,

The avenues Q and R, from west to east, contain in succession, agricultural implements, court for sculpture, part of South Australia, Canada, and the East Indies.

Avenue S is principally occupied by Class 1.

NORTHERN HALF.

The Avenue I, and part of the Central Avenue, proceeding east to west, contain cotton, leather, furs, part of mineral manufactures, furniture, paper, fine arts, Malta, Ceylon, and part of the East Indian articles.

The Avenues G. and H. contain carriages, mineral manufactures, marine and other engines, Guernsey and Jersey, fine arts, Maltese and East Indian contributions.

Avenue F. is appropriated to locomotive engines and railway mechanism.

Avenues C, D, and E contain, in a separate enclosure, cotton and other machinery in motion; beyond this the Western Refreshment Court, machines in motion, lathes and tools, mills, steam-engines, and a part of the East Indian articles.

Avenues A, B, contain cotton machines, woollen machines, flax machinery, silk and lace machinery, paper and printing machines in motion, Models and naval architecture.

GALLERIES.

The Galleries are named, respectively, South, Central South, Central North, and North.

The portions of the West (South) Galleries, near the Transept, South Entrance, are occupied by shawls.

South Gallery, P.—Proceeding from east to west, contains silks, chemical substances, substances used as food, vegetable and animal substances, naval architecture, guns, &c.

The interval between the west termination of the South Gallery, and that of the Central South, is occupied by naval, and other models.

Central South Gallery, M.—Proceeding from west to east, contains philosophical instruments, precious metals, tapestry, and silks. The interval between the western termination of the Central South Gallery, and that of the Central North, is occupied by philosophical and other contrivances, models, &c., and the great organ, which is in the centre.

Central North Gallery, I.—From west to east contains philosophical, surgical and musical instruments, glass, and pottery.

The interval near the Transept, between these Galleries, is occupied by pottery.

North Gallery, F.—From east to west, contains pottery, animal and vegetable manufactures, cutlery, surgical instruments, and models in civil engineering.

The portions of the West (North) Galleries, near the Transept, North Entrance, are occupied by pottery.

Immediately over the South Entrance, in the Gallery, is the apparatus connected with the large electric clock.

EASTERN HALF.—*Ground Floor.*

The Nave, or Central Avenue, contains the Great Diamond, Sculpture, Wine-jars from Spain, Artillery, Sculptures, Statue of Michael and Satan, Parisian Organ, Colossal Statue of Godfrey de Bouillon, Stained Glass Window, Amazon, Colossal Lion, Church Bell, Group of Horses, block of Zinc Ore.

The southern half of the ground-floor space is occupied, proceeding from west to east, by the following countries:—China, Tunis, Brazil, Switzerland, France, Belgium, Austria, Russia part of, Zollverein, United States, France part of.

The northern half by Persia, Arabia, Greece, Egypt, Turkey, Spain, Portugal, Italy, France, Belgium, Holland, Austria, Zollverein, North Germany, Russia, United States, Belgium part of, Zollverein part of.

The north-east corner, including parts of Avenues C, D, E, are occupied by the Eastern Refreshment and open courts.

GALLERIES.

The Galleries near south entrance of Transept in the Eastern Division are occupied by articles of Clothing, Hosiery, &c.

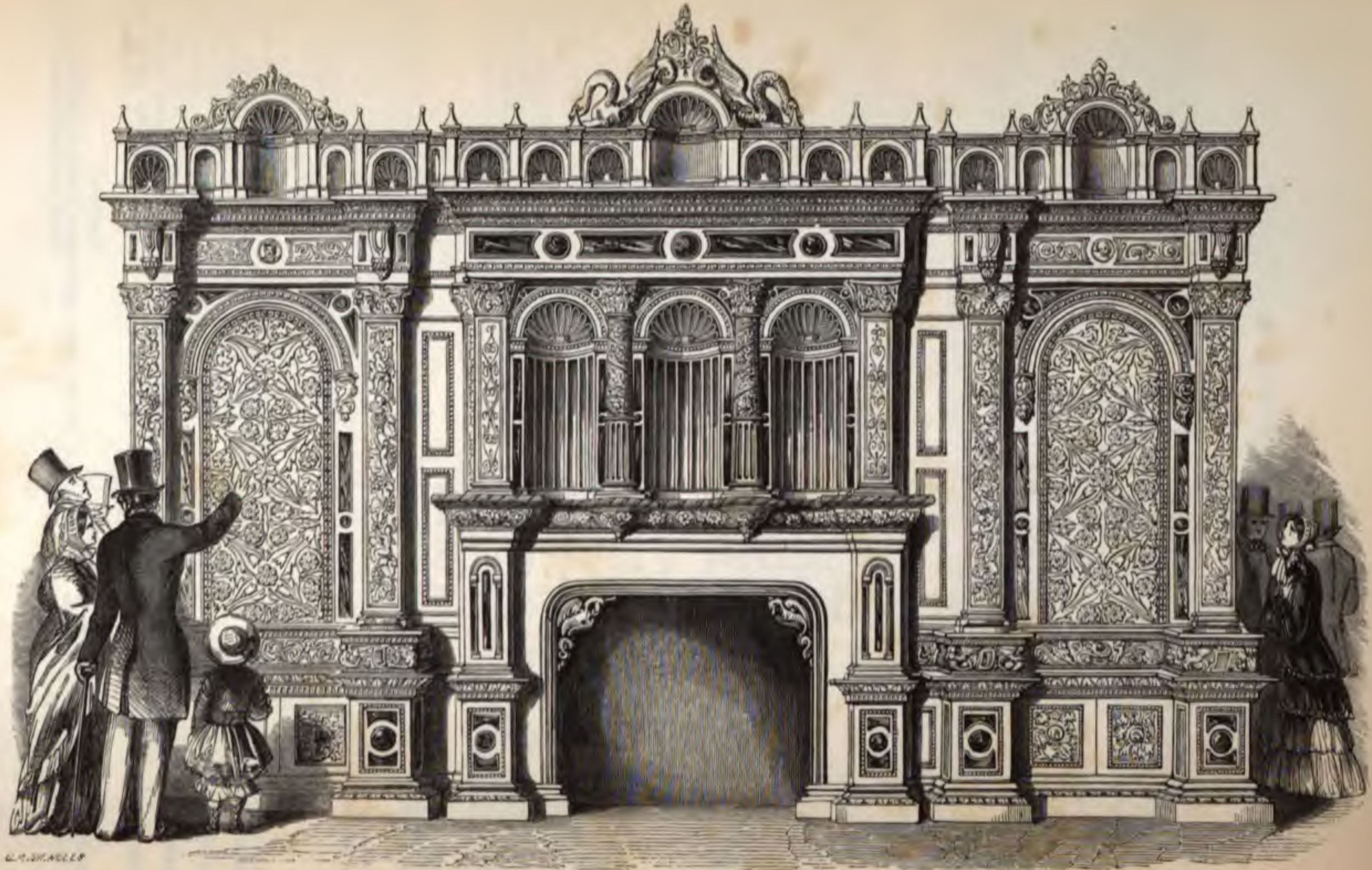
South Gallery, P, is occupied partly by France and other States.

Central South Gallery, M, is occupied by Switzerland, France, Austria, and the United States.

Central North Gallery, I, contains the United States and other countries.

North Gallery, F, Specimens of Stained Glass, &c.

The Galleries near the north entrance of the Transept are occupied by the Liverpool and Hull collection of articles and miscellaneous objects.



1. CABINET MADE FOR HER MAJESTY. MESSRS. HOLLAND.

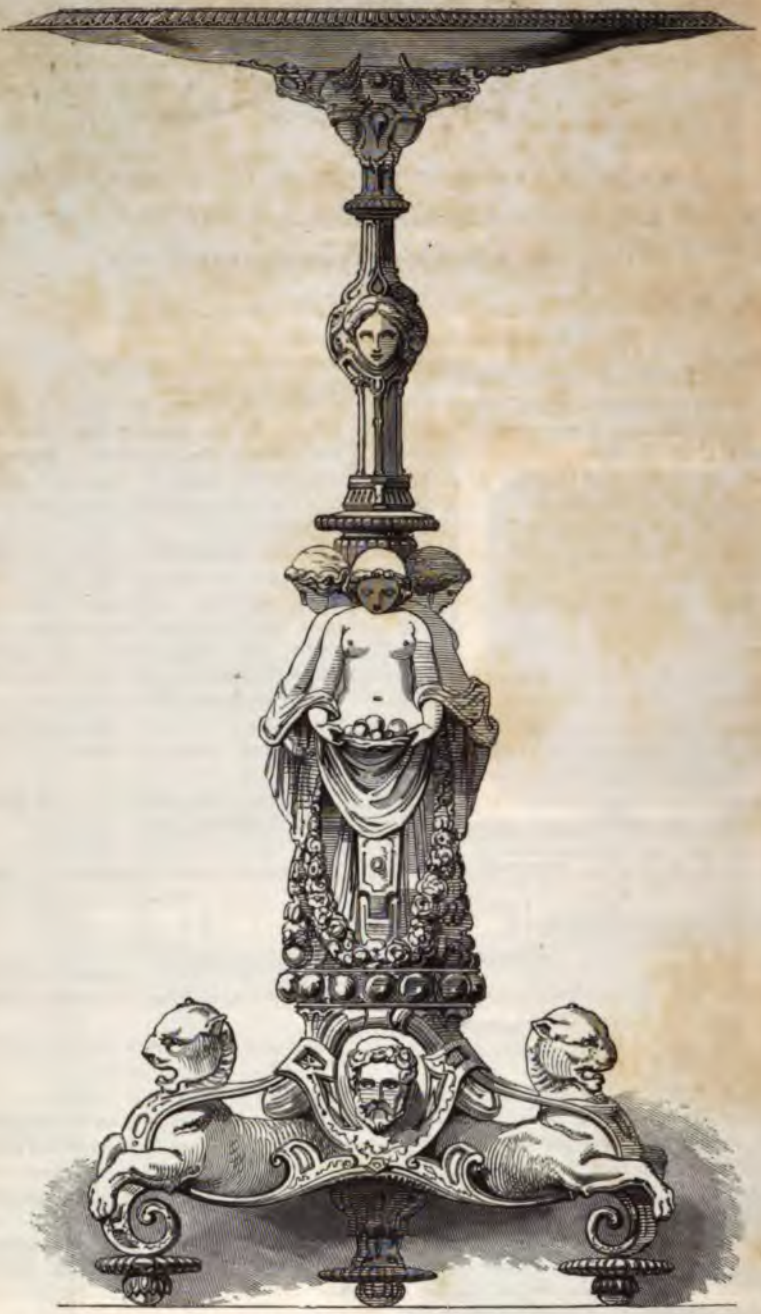


TABLE OF GOLD AND SILVER ELECTROPLATE, EXHIBITED BY HER MAJESTY.

ARTICLES EXHIBITED BY HER MAJESTY THE QUEEN, H. R. H. THE PRINCE ALBERT, AND H. R. H. THE PRINCE OF WALES.

IN THE FOUR SECTIONS OF THE EXHIBITION.

HER MAJESTY THE QUEEN.

Jewel case in the cinque-cento style, designed by L. Gruner, Esq., and executed at the manufactory of Mr. Henry Elkington, at Birmingham. The material is bronze, gilt and silvered by electro-type process ; upon this case are portraits on china of Her Majesty, H.R.H. Prince Albert, and H.R.H. the Prince of Wales, copied from miniatures by R. Thorburn, Esq., A.R.A. The small medallions, representing profiles of their R.H.'s the Princes and Princesses, were modelled from life by Leonard Wyon, Esq.

Table of gold and silver electro plate, manufactured by Messrs. Elkington. The top of the table is an electrotype reproduction of a plate of fine workmanship, obtained and copied for Mr. H. Elkington under the direction of the Chevalier de Schlick. The eight subjects in bas-relief represent Minerva, Astrologia, Geometrica, Arithmetica, Musica, Rhetorica. The centre figure represents Temperance surrounded by the four elements. At the bottom of this plate is an inscription pointing to the artist. The table is designed by George Stanton, a young artist in the employ of Mr. H. Elkington, and a student in the Birmingham School of Design.

Portrait of Her Majesty on Sèvres china, size of life, half length, by A. Ducluzeau, after a portrait by F. Winterhalter. Painted in 1846.

Portrait of H.R.H. Prince Albert, on Sèvres china, size of life, half length, painted by A. Bezanget, after a portrait by F. Winterhalter. These portraits are exhibited jointly by Her Majesty and H.R.H. Prince Albert.

A cradle, carved in Turkey boxwood by W. G. Rogers, and designed by his son, symbolising the union of the Royal House of England with that of Saxe Coburg and Gotha. One end exhibits in the centre the armorial bearings of Her Majesty the Queen, surrounded by masses of foliage, natural flowers and birds; on the rocker, beneath, is seen the head of "Nox," represented as a beautiful sleeping female, crowned with a garland of poppies, supported upon bats' wings, and surrounded by the seven planets.

The other end, or the back of the head of the cradle, is devoted to the arms of H.R.H. Prince Albert; the shield occupies the centre, and round it, among the arabesque foliage, the six crests of the Prince are scattered, with the motto "Treu und fest." Below, on the rocker, is discovered a head of "Somnus" with closed eyes, and over the chin a wimple, which, on each side, terminates in poppies.

In the interior of the head of the cradle, guardian angels are introduced; and above, the royal crown is found embedded in foliage. The friezes, forming the most important part of the sides of the body of the cradle, are composed of roses, poppies, conventional foliage, butterflies, and birds, while beneath them rise a variety of pinks, studied from nature. The edges and the insides of the rockers are enriched with the insignia of royalty and emblems of repose.

Two cut glass candelabra, manufactured by Messrs. Osler, of Birmingham.

Axminster carpet, designed by L. Gruner, Esq., and manufactured by Messrs. Blackmore Brothers, at Wilton, for Messrs. Watson, Bell, & Co.

Axminster carpet, designed by L. Gruner, Esq., and manufactured at Glasgow, for Mr. Dowbiggen.

A Berlin wool carpet executed by one hundred and fifty ladies of Great Britain. The dimensions of this carpet are thirty feet in length, and twenty in breadth. The carpet has been produced in the following manner:—The pattern, originally designed and painted by the artist, has been subdivided into detached squares, which have been worked by different ladies, and on their completion the squares have been reunited, so as to complete the design. In the pattern, which consists partly of geometrical, and partly of floral forms, heraldic emblems are also introduced. The initials of the executants are ornamentally arranged, so as to form the ext [illegible]. The whole design is connected by wreat [illegible] leaves and foliage, the centre group [illegible] store from whence they have been distri [illegible]

The carpet has been produced under [illegible] of a Committee. The design by [illegible] the patterns were pain [illegible] the superintendence [illegible]

HIS ROYAL HIGHNESS PRINCE ALBERT.

Three samples of grain grown on the royal farms at Windsor, consisting of wheat, oats, and beans, one bushel of each.

Two slabs for tables, designed by L. Gruner, Esq., in the cinque-cento style, executed by Mr. Thomas Woodruff at Bakewell, in Derbyshire stones, in imitation of the Florentine mosaic.

A block of Parret coal from West Wemyss colliery, Kirkaldy, Fifeshire, partly polished.

Garden seat, designed by L. Gruner, Esq., and executed in Fifeshire by Thomas Williams Waun, of parret or cannel coal, from the estate of Rear Admiral Wemyss.

Candelabrum in the cinque-cento style, designed by L. Gruner, Esq., modelled by Ant. Trentanove, and executed in scagliola in imitation of giallo antico, by L. Romoli.

Group in marble, "Theseus and Amazons," executed at Rome by — Engel, Esq., from Hungary, pupil of the Royal Academy.

HIS ROYAL HIGHNESS PRINCE ALBERT, ON BEHALF OF HIS ROYAL HIGHNESS THE PRINCE OF WALES.

Shield presented by His Majesty the King of Prussia to His Royal Highness the Prince of Wales, in commemoration of the baptism of the infant Prince, for whom His Majesty acted as sponsor.

The pictorial embellishments of the shield, the general plan for which was given by the king himself, were designed by Doctor Peter Von Cornelius, and the architectural ornaments by Counsellor Stüler. The execution of the remaining portions—the goldsmiths' work, enamel, &c., were performed by M. G. Hossauer; the modelling by M. A. Fischer; the chasing by M. H. Mertens; and the lapidary work by M. Calandrelli.

In the centre of the shield is a head of Our Saviour. The middle compartment, surrounded by a double line of ornamental work, is divided by a cross into four smaller compartments, which contain emblematic representations of the two Sacraments, Baptism and the Lord's Supper, with their Old Testament types, the opening of the fountain in the rock by Moses, and the fall of manna. At the extremities of the arms of the cross are represented the Evangelists, noting down what they have seen and heard in the Gospels, which are to communicate to all futurity the plan of man's salvation, and prove inexhaustible sources of divine revelation and doctrine.

On the extreme points of the arabesques that rise above the Evangelists, are represented the Christian virtues of Faith, Hope, and Charity, and of Christian Righteousness. Around the entire centre stand in a circle the twelve Apostles. Peter is seen under Faith represented in the arabesque; on the right and left of him are Philip and Andrew; under Hope is James; on either side are Bartholomew and Simon; John is placed beneath the figure of Charity; on either side are James the younger and Thomas; under Righteousness is Paul; on the right and left are Matthew and Judas Thaddeus, going forth into the world to teach and to baptize, and to propagate the kingdom of the Redeemer.

The relievo, which runs round the edge of the shield, represents the betrayal, the redeeming atonement of Christ, and his resurrection. Another portion represents Our Lord's triumphant entry into Jerusalem; a third portion the descent of the Holy Ghost, the preaching of the gospel, and the formation of the church. The fourth and principal compartment contains an allegorical representation of the birth of the Prince of Wales, and of the visit of the King of Prussia, accompanied by Baron Humboldt, General von Natzmer, and the Count von Stolberg, and welcomed by H.R.H. Prince Albert and the Duke of Wellington; a Knight of St. George being represented on the beach standing upon a dragon.

The shield has been denominated the Buckler of Faith. The inscription on the shield runs thus :—

FRIDERICUS GULIELMUS REX BORUSSORUM
ALBERTO EDUARDO, PRINCIPI WALLIÆ,
IN MEMORIAM DIEI BAPT. XXV JAN. A. MDCCCXLII.

COUNT ERNEST COBURG-GOTHA.

Fruit stones of various sizes, carved with a penknife.

Sect. I.

Class 1.

MINING AND MINERAL PRODUCTS.

Brookman & Langdon, 28 *Great Russell Street*—Proprietors.

Specimens of black lead from Cumberland, in the raw state, and as hardened for use.

[The Cumberland graphite is obtained from a large and very irregular vein cutting through the green slate and porphyry, and the mineral occurs in large lumps, found here and there expanding and thinning out with no apparent order. About 50 years ago one of the largest masses ever discovered was suddenly met with, and yielded about 70,000 lbs. of the purer kind of black lead. Since then there has been nothing found of any value. The mines are near the head of Borrowdale, the entrance being about 1,000 feet above the sea, and as much below the summit of the mountain.—D. T. A.]

Bell, John, 25 *Buckingham Place, Fitzroy Square*—Designer and Manufacturer.

Specimen of oolitic limestone, from the Oreton Bank Works, Stottesden, Cleobury Mortimer, Shropshire.

Chiselled, sanded, grounded, and polished marble, adapted for columns, pedestals, &c.

A pair of obelisks in oolitic limestone.

[It is rarely that the oolites are sufficiently uniform in texture, and sufficiently hard, to take a good polish. Specimens, however, occur, chiefly from particular parts of the series, and in limited localities, which may be made ornamental, as in the case exhibited.—D. T. A.]

Clark, George Houstoun, *Rotherhithe*—Agent.

Specimen of Devon Haytor granite, from the quarries of the Duke of Somerset, Haytor Rocks, South Devon. Blocks of the largest dimensions can be produced from these quarries. London Bridge, Fishmongers' Hall, the columns in George IV.'s Library, British Museum, part of Tothill Fields Prison, and the pillars to the gates of Christ's Hospital, are all of this granite.

Specimens of Bramley Fall stone, from the Fair Head quarries, Yorkshire, and from the quarries at Marshall Meadows, Berwick-on-Tweed.

Welsh Slate Company.

Barwis, W. H. B., *Secretary*, 1 *New Boswell Court*.

Rough block of slate from the quarry of the Welsh Slate Company, at Festiniog, Merionethshire.

Slabs of slate, sawn and planed.

Roofing and other slates.

[The slates of Festiniog are of admirable quality, and obtained in slabs of very large dimensions, adapted to all the more important uses of the material. The quarries are extensive, and give employment to a large population.—D. T. A.]

Bituminous Shale Company, 145 *Upper Thames Street, and Wareham, Dorset*—Manufacturers and Producers.

Specimen of bituminous shale, known as the Kimmeridge coal, obtained from the cliffs at Kimmeridge, in the isle of Purbeck, in the county of Dorset. The quarries were opened in August, 1849. It is a combination of bitumen with clay, and from it are obtained, by distillation, volatile mineral oil, grease, asphaltum, and manure, specimens of each of which are exhibited.

[Bituminous schists or shale are not confined to any peculiar geological or topographical limits, and are probably, in most cases, the result of the decomposition of large quantities of animal remains.

The Kimmeridge coal is of high specific gravity (1·319), of dark-brown colour, and without lustre; it effervesces slightly with acids, and burns readily with a yellowish, rather smoky, and heavy flame. It is a very local deposit.—D. T. A.]

Buckingham, James, 13 *Judd Place East, New Road*—Producer and Importer.

Specimens of anthracite from Bonville's Court Collieries at Tenby, Pembrokeshire, South Wales; which have been worked 25 years. The anthracite is composed of—

Carbon . .	94·18	Sulphur . .	0·59
Hydrogen . .	2·99	Nitrogen . .	0·50
Oxygen . .	·76	Ash . . .	0·98

Its specific gravity is 1·4119.

Carnegie, W. F. L., *Kimblethmont, Arbroath, Scotland*—Proprietor and Manufacturer.

Flag-stones, rough and planed, from Leysmill Quarries, Forfarshire, and freestone from Border Quarries, the property of the exhibitor.

Flag-stone, rough and planed, from Lord Panmure's quarries at Carmyllie, and freestone from Lochee Quarries, belonging to the Harbour Commissioners of Dundee, of which the harbour and dock are constructed.

Flag-stone from Balgavies Quarries, belonging to Mr. Baxter, of Ellangowan. Flag-stone, rough and
from Balmashanner Quarries, belonging to
Carnegy, of Lowee.

Old red sandstone shale, or stone-clay
tile from the same, manufactured by

Flag-stone from Guynel Quar
Previor.

All these flag-stones are
broath, and are known as "

SHARP, SAMUEL, *Commercial Road, Lambeth*, Agent to **ALEXANDER ADAM**, *Wick, N. Britain* — Proprietor.

Rockhill paving stones, from the original quarries, shipped from the port of Wick, showing the different thicknesses as they naturally arise in the quarries.

TOWLER, EDWARD, *Market Rasen.*

Stones adapted for paving, walling, road-making, and polishing from Kirton Lindseys Tunnel Stone Works, containing 95 per cent. of carbonate of lime.

Blue lias and hydraulic cement.

FRANKLIN, PLIMEAS LEWIS, *Galway, Ireland*—Proprietor.

Block of black marble, with polished surface. Black marble columns for statues, from quarries on the banks of Lough Corrib, near Galway; used also for ornamental marble works, monuments, tombs, &c.

SINCLAIR, J., *Forss, Thurso, Scotland*— Manufacturer.

A cistern or bath of Forss-Rockhill flag. Samples of the stone, showing the natural surface, the half-rubbed, and the full-rubbed surface. Three portions of a passage of twenty-four feet long by six feet broad each, laid with the same pavement, showing the three different kinds of surface.

The principal uses of the article are laying footways, courts, railway stations, floors of manufactories and warehouses, kitchens, cellars, cottages, entrance halls, churches, &c. When used with iron girders, it renders mills, &c., fireproof, and is useful for farm buildings, and for cisterns, baths, manure tanks, troughs in chemical works, coping, for garden walls, &c. The pavement is found at the Forss-Rockhill quarries, four miles west from Thurso, Caithness, and it is there manufactured chiefly by machinery. It is said to be of a hard, close, strong, and uniform quality, and impervious to wet. It occurs in beds of various thickness, from one inch to three or four inches, and from one foot to eighty or a hundred feet superficial. The stone has been worked for more than twelve years, and is sent in large quantities to London, Glasgow, and other towns.

[The Caithness flags are well known and much used for various economic purposes, chiefly paving. They are quarried from the middle division of the old red sandstone (Devonian) series, as developed in the north of Scotland. The schists yielding them are often dark coloured and highly bituminous, slightly micaceous and calcareous, and often resembling rocks of much greater geological antiquity. Obscure vegetable impressions, and the remains of extinct fishes, are very frequently found in them, and these are often of considerable interest in the natural history of the ancient inhabitants of our globe.—D. T. A.]

HAYWOOD, JONAS, *Ardsley, near Barnsley*— Producer.

Grindstones from the Ardsley Oaks Quarry, Barnsley, used principally in Lancashire and Yorkshire, for the grinding of machinery, files, edge tools, needles, &c., and for building purposes.

DOVE, DUGALD, *Nitshill, Hurlet, near Glasgow* —Producer.

Freestone block, from Nitshill quarry. Grindstone from the same quarry, three feet in diameter by six inches thick.

[The sandstones and greenstones of Nitshill are chiefly or entirely of the carboniferous period, and include several kinds of various degrees of excellence.—D. T. A.]

RAYNES, LUPTON, & Co., *Liverpool*— Producers.

Specimens of pure limestone, from Pentregwyddel quarries. near Abergele, Denbighshire; used in the rough chemical manufactures, and as building cement (lime); and in the manufactured state, as a lithographic stone, &c.

Specimens of stone, from Graig-lwyd quarries (Penmaen-Mawr, Carnarvonshire), cut into paving, channel, and kerb-stones, and arranged in a frame as they would appear in a street pavement; and shown in a block, used as wheelers, or tram-road stones, channels, &c.

[The stone from Penmaen-mawr, here exhibited, is an extremely hard compact rock of igneous origin, admirably adapted, from its toughness, for all kinds of paving purposes. It is much used in the neighbourhood of Liverpool, and is also exported largely.—D. T. A.]

BUILDING STONES, MARBLES, &c., IN SIX-INCH CUBES.

Oolite.

Upper oolites, from the neighbourhood of Bath.

Inferior oolite, from Dundry Hill, near Bristol.

Lias.

Blue lias (hydraulic lime when burnt), from Keynsham, near Bristol.

White lias, from Radstock and Poulton, Somerset.

"Landscape" lias, from Cotham, Bristol.

New Red Sandstone and Calcareo-Magnesian Conglomerates.

New red sandstone, found at Bristol.

Coarse sandstone, from Easton, Bristol.

Indurated red sandy marl, from Chew Magna, Somerset.

Fine-grained yellow conglomerate, found near Harley Place, Clifton.

Fine-grained crystalline calcareous conglomerate, found near Durham Down.

Indurated red sandstone with calc spar.

Re-cemented magnesian conglomerate, from Clevedon, Somerset.

Conglomerate with quartz, limestone, &c., from Sea Mills, below Bristol.

Conglomerates from Clifton, Bristol; and from the tunnel of the Bristol Waterworks, Harptree, Somerset.

Silicious conglomerate with jaspery iron-stone, from Brandon Hill, Bristol.

Conglomerate, from the Mendip Hills.

Gypsum (sulphate of lime), from Windford, Somerset.

Coal Measures.

Pennant sandstones, from the middle part of the coal series.

Fine silicious grit (millstone grit, or miner's "farewell rock"), from Bristol.

Carboniferous or Mountain Limestone.

Series of limestones and marbles from the defile of the river Avon, Clifton, Bristol.

Old Red Sandstone, Silurian, &c.

Old red sandstone, from the banks of the Avon, below Bristol.

Grey sandstone, from Tortworth, Gloucestershire.

Red silicious conglomerate, from Markham Bottom, near Bristol.

Transition limestone and sandstone, from Tortworth and Charfield, Gloucesterhire.

Amygdaloidal trap rock, from Damory, Gloucestershire.

Samples of the brick and pottery clays, with specimens of the manufacture.

Samples of sands, used for commercial purposes, and of the deposit from which the "Bath scouring brick" is made. This brick is manufactured by Messrs. Ford & Son, Bridgewater.

Samples of ochre, reddle (oxide of iron), fullers' earth, &c.

Samples of strontian, massive and fibrous; gypsum, massive and fibrous; barytes (sulphate of); lime, white and the brown, or hydraulic.

Iron ores — hæmatite, compact, silicious, stalactitic, reniform, &c.

Ores of zinc: Blende (sulphuret); calamine (carbonate).

Ores of lead: Galena (sulphuret); white lead ore (carbonate).

Phosphate and muriate of lead. Manganese ore (black antimony ore, sulphuret).

Specimens of quartz crystals (Bristol diamonds); crystals of calc spar; geodes (locally, potato-stones), containing various crystals, agates, &c.

Series of the various seams of coal, worked in the Bristol coal basin, showing the cleavage, fracture, &c.

[This series of rocks, illustrating the economic geology of the Bristol district, is of considerable interest, as showing a large succession of beds, and the result, in some measure, of their close association at the surface. Of the substances used economically, the sands for Bath bricks, ochres, quartz crystals, and geodes, are worthy of notice. Of the ochres, the red and yellow are found in considerable quantities and of very good quality. They are friable, and stain the finger. The red is of deep colour, between crimson and purple, and of strong body; the yellow of fine gold colour. They are dry and mix well. The Bristol diamonds are clear quartz crystals, chiefly found near Clifton.—D. T. A.]

NICHOLLS, JOHN, *Trekenning, St. Colomb*—Proprietor.

Block of porphyry or elvan stone, raised near Newquay, Cornwall; it is said to resist the action of the weather.

NICHOLSON, Sir A. N., *Fetlar, Zetland.*

Chromate of iron and clays.

[The chromate of iron is chiefly used in the production of chromate of potash, the ore being cleaned, pounded, calcined with a certain proportion of nitre, and evaporated after lixiviation with water. From the neutral chromate thus obtained, or the bichromate, are produced chromate of lead (chrome yellow); a green oxide used as an enamel colour in porcelain (chrome green); and a beautiful vermilion (subchromate of lead). Chromic acid is also manufactured from the same mineral. Chromate of iron is obtained in England principally from the Shetland Islands. —D. T. A.]

NIXON, JOHN, & Co., *Cardiff*—Producers.

Merthyr and Cardiff steam coal, obtained from the Werfa colliery near Aberdare and Merthyr Tydvil. This coal is used for steam purposes, more especially for steamships going long voyages. Its weight is 82·29 lbs. per cubic foot; its specific gravity 1·31. It is said to produce very little smoke. The following is the analysis of this coal as given in the Second Report of the Commissioners (Sir H. de la Beche and Dr. Lyon Playfair) appointed by Government to test the coals suited to the Steam Navy:—

Carbon	90·27
Hydrogen	4·12
Nitrogen, with traces of sulphur	1·83
Oxygen	2·53
Ash	1·25
	100·00

HAINES, RICHARD, & SONS, *Denbigh Hall, Tipton, Staffordshire*—Proprietors.

Large specimen of the Staffordshire thick, or ten-yard coal; height, 9 feet 6 inches; circumference, 21 feet 10 inches; weight, 13 tons. Brought 70 yards underground to the bottom of the shaft, and raised from a depth of 165 yards by the ordinary steam-engine, with no other apparatus than that regularly in use.

OLD DELABOLE SLATE COMPANY (by JAS. CARTER), *Camelford*—Proprietors.

Slate slab, as raised from the quarries at Delabole.

Slate cistern for holding water, liquid manure, oil, acids, &c., capable of containing 2,000 gallons. If used for water for domestic purposes, a self-supplying filter is attached, so that the water withdrawn at the tap passes through the filter.

Specimen of Davey's patent ridge slate.

Slate slab, used for flooring, landings, cisterns, &c.

Roofing slates.

[The magnificent quarries of Delabole have been opened for at least three centuries, and have supplied a large quantity of excellent slate. They are worked in the Devonian slates, near Tintagel, where they are chiefly shipped. The quality is good, combining lightness with strength, and resisting exposure perfectly.

This slate is used not only for roofing, but also in large slabs for various purposes.—D. T. A.]

PAINE, JOHN M., *Farnham*—Producer.

Phosphoric fossils and marls from the upper greensand, the gault, and the upper part of the lower greensand formations. These fossils are stated to contain as high a percentage of phosphate of lime, as ordinary bones; and they have been proved to be useful in fertilizing land. They are easily converted into superphosphate of lime, by the agency of sulphuric acid. The clean fossils contain from 50 to 70 per cent. of bone-earth phosphate; the green marl (without fossils) contains from 4 to 15 per cent. The substances found are characterized by the almost total absence of carbonic acid, and are, therefore, the more valuable as a material for forming superphosphate of lime. These phosphoric fossils are to be found in greater or less quantities at the bottom of the chalk range of hills throughout England. The fossils and marls are chiefly dug from the lands of the exhibitor at Farnham, in Surrey.

Transverse section of pocket of hops of the choicest "Golding" variety, grown upon the phosphoric marl of the "upper greensand."

Entire pocket of the same as prepared for sale.

[The concretions of phosphate of lime, which were discovered by Mr. Paine in the cretaceous rocks near Farnham, in a state well adapted for economic use, and which were much employed for agricultural purposes, appear to exist in two or three bands in the upper greensand and gault, not extending into the true lower greensand. The concretions are occasionally formed about an organic centre, and appear to be instances of segregations of a mineral substance at one time generally distributed in a bed while being deposited at the bottom of a sea. The phosphoritic nodules are everywhere found with green earth.—D. T. A.]

PHILLIPS, WILLIAM, *Morley Works, near Plympton*—Producer and Proprietor.

1. Specimen of disintegrated granite from Morley Works, Devon, in which the felspar is in a decomposed state, pure, and in a large proportion, compared with the quartz, schorl, and mica.

2 and 3. Prepared china clay, or decomposed felspar, the result of washing; used chiefly in porcelain, fine and common pottery, calico-dressing, and paper-making.

4. Specimen of clay for fire-bricks and crucibles.

5. Plymouth porcelain, made by Cookworthy, the discoverer of china clay in this country.

6 and 7. Porcelain made from Morley clay.

8 and 9. Pottery from this clay, made of 80 per cent. of clay, with flint and china-stone.

[A large quantity of china clay is fo [illegible] outh
side of the Dartmoor granite, th [illegible]
being excellent, and the pos [illegible]
for the supply of the St [illegible]
carriage. The chin [illegible]
interest, not only [illegible]
material from w [illegible]
facturer of porc [illegible]
material. The p [illegible]

simply mechanical, but is capable of much improvement, and the coarse parts of the clay are well adapted to the manufacture of brick of various kinds. The china clay is obtained from the decomposition of particular varieties of granite.—D. T. A.]

10 and 11. Pottery of ordinary manufacture, with small proportions of china clay, flint, and stone.

12 and 13. Bricks made from clay.

14, 15, and 16. Pottery and china, illustrative of the application and uses of this china clay, which has a larger proportion of alumina than other china clays, and is free from metallic oxides.

[The china clay and china stone used in the manufacture of the finer kinds of porcelain are chiefly obtained from decomposed granite; the felspar of the granite, under certain circumstances, yielding to the action of the weather, and parting with its alkaline earths, and the harder, heavier, and coarser parts of the granite removed by mechanical washing, either naturally or artificially. The purified material thus obtained is called *kaolin*, its specific gravity is from 2·21 to 2·26. Some of the finer kinds contain, when boiled for a short time in a solution of potash, about equal parts of silica and alumina, upwards of 10 per cent. water, and from 2 to 10 per cent. of free silica, the mineral being therefore represented by the formula $A : S : + 2\,Aq.$

The formula for felspar is $3\,A : Si^3 + K : Si^3$, the potash being often replaced by soda, and the nature of the change may thus be understood. The best china clay in England is obtained from Cornwall and Devonshire.—D. T. A.]

OAKELEY, EDWARD, *Coed Talon, near Mold, Flintshire, Wales.*

Steam-coal from Coed Talon and Leeswood collieries, near Mold, North Wales.

[This noble column of coal, said to weigh 16 tons, is from the main coal of the Flintshire coal-field, a seam nine feet thick, accompanied by five other beds of coal and four beds of ironstone. The quality of the coal is bituminous, and the proportion of ash less than 3 per cent. The Flintshire coal-field is a narrow strip, partly covered with new red sandstone, and extends 40 miles from north to south, with an ascertained breadth of from two to 12 miles, being cut off by a north and south fault. The mines supplying the specimen extend over 1,300 acres, and were opened about 30 years ago. About 2,000 tons of coal per week are raised from them.—D. T. A.]

SHIPPARD, THOMAS, *Wareham*—Proprietor.

Potter's, and pipe or brown clay, from Carey pits, with ware and tobacco pipes made from them; also silicious sand, for the manufacture of glass.

PIKE, WILLIAM & JOHN, *Wareham*—Producers.

Potter's or blue clay, from the island of Purbeck, Dorsetshire, used in the British potteries.

Stoneware clay, used in the London and Bristol potteries for the manufacture of stoneware and drain pipes.

Pipe clay, for the manufacture of tobacco pipes.

Alum clay, for the manufacture of alum.

[A considerable quantity of clay fit for ordinary potters' work, and for the manufacture of tobacco-pipes, besides some alum schist, is obtained in the small peninsula called the isle of Purbeck, on the Dorsetshire coast. This little tract of land contains a curious series of cretaceous, Wealden, and oolitic deposits; among the latter is the Kimmeridge coal elsewhere described, and above the whole series are clays of the Hampshire basin, in the manufacture of which the coal is used. These plastic clays belong to the lowest tertiary deposits.—D. T. A.]

POWELL, WILLIAM JOHN, *Tisbury, near Hindon, Wilts*—Producer.

Varieties of hard and soft building stone, from Tisbury. The hard from Chicksgrove quarry, 20 feet below the surface, forming part of the Portland bed. The soft from Tuckermill quarry, 5 feet deep. The hard is used for steps, pavements, tablets, monuments, &c. The soft, for fronts of houses, cornices, and general building purposes. Both are adapted for resisting the influence of the weather.

Geological specimens:—A species of coral, from the sand of the upper oolite formation at Tisbury, found in a vein extending northward, and now converted into flint and chert. The hardest flints were originally manufactured into gun flints.

A fish from the oolite formation at Tisbury.

Specimen of part of a fossil tree from Tisbury, found in an excellent state of preservation in the oolite formation.

[The town of Tisbury is on the Portland stone; but the lower beds of the Purbeck series, as well as the uppermost oolites, are quarried in the neighbourhood. A continuous bed of flint, about two inches thick, is seen in one of the quarries, and from this band are obtained beautiful specimens of coral in chalcedony. Some of the oolite of the neighbourhood is very fine grained.—D. T. A.]

ROUND, D. G., *Hange Colliery, Tipton, near Birmingham*—Producer and Proprietor.

Specimens of iron ore.

Specimen of coal from the thirty feet, or thick coal seam of South Staffordshire, cut out of the solid coal. This specimen is of the largest dimensions that could be brought out of the mine up a seven-feet circular shaft. It measures eighteen feet in circumference, and weighs five tons.

The rope used in lifting it, is also exhibited; it was manufactured by Mr. Wm. A. Chubb, of Woodpark, Devonport.

The chains used in sending the coal out of the mine are shown in connexion with the rope; the block was raised by means of the ordinary machinery employed in the colliery. The picks used in hewing the coal.

[The thick coal seam of Staffordshire, of which a complete section is given by the exhibitors, and of which also a fine block weighing 5 tons is shown by Mr. Round, does not extend over a very large area, consisting, in fact, of the accidental junction of several seams with very thin and carbonaceous bands. The whole are necessarily worked together, and below them are no less than eight other seams (one of them 9 feet thick) worked near Wolverhampton. The district yields much ironstone, and the coal is being rapidly abstracted, being used to an enormous extent for manufacturing purposes and iron smelting in the neighbourhood of Birmingham.—D. T. A.]

JAMES & AUBREY, *Swansea*—Producers.

A large block of anthracite, or stone coal, from Cwmllynfell, in the Swansea valley.

[The great South-Welsh coal-field includes, at a moderate estimate, as much as 1,000 square miles of country, unequally divided between bituminous coal and anthracite, the dividing line being nearly coincident with the Neath Valley, and the anthracite portion extending to the west. The anthracite has only recently been introduced into use, but is now recognised as a very important material, the different kinds being of great value for special purposes, and yielding sometimes as much as 92 per cent. of carbon. The pure Welsh anthracite has been found to evaporate 10 lb. 8½ oz. water, by one pound of coal, the best bituminous coal not evaporating more than 8 lbs. There is no reason to suppose any difference in geological age between the bituminous and anthracite coals.—D. T. A.]

INCE HALL COAL & CANNEL COMPANY, *Wigan*—Proprietors.

Cannel coal, with various vases, manufactured of cannel coal. The cannel coal yields 11·673 feet of gas per ton, which is composed of—

Hydrogen	40·30
Light carburetted hydrogen	33·83
Carbonic acid	11·35
Olefiant gas and divers hydro-carbons	8·50
Atmospheric air	4·32
Carbonic oxide and aqueous vapour	1·53
Nitrogen	0·19
	100·02

Specific gravity of gas . . 6·20
Coke per ton produced 13 cwt. 18 lbs.

Specimens of the Arley and Pemberton coal, sent by the same exhibitors, will be found in the south enclosure, beyond the western extremity of the building.

[The Wigan coal-field is a portion of that known as the Lancashire and Cheshire, or Manchester, great coal-field, which ranges nearly fifty miles in length, with a breadth of ten miles on an average. The productive coal area is thus nearly 400,000 acres, and is divided into three principal portions, of which the middle one includes the thick coal seams, and these are worked in various places, Wigan being not the least important. The principal coals are a good caking coal (Arley main) and a very valuable bed of cannel; the former well adapted for domestic purposes, the latter yielding a large quantity of gas.

The total thickness of the carboniferous deposits is very considerable; but the number of seams of coal is large, and the thickness of many of them considerable.

The cannel is of fine quality, and takes a high polish, as seen in some of the specimens exhibited.—D. T. A.]

CAMERON'S COALBROOK STEAM COAL and SWANSEA and LOUGHOR RAILWAY COMPANY, 2 *Moorgate Street.*

Specimen of steam coal (of a quality intermediate between bituminous coal and anthracite), from the mines near Loughor, in the county of Glamorgan, South Wales, which have been worked about eight years. It is exported from the ports of Swansea and Llanelly in the Bristol Channel.

BARROW, RICHARD, *Staveley Works, near Chesterfield, Derbyshire.*

Coal, from the mines at Staveley, in the county of Derby, which belong to the Duke of Devonshire. This block of coal, 17 ft. 6 in. long, 6 ft. wide and 4 ft. thick, was raised from a shaft 459 feet deep. The coal is 6 ft. thick, and is valued for its cohesive strength and power of combustion, being in general use for steam-boats.

Three small pieces of coal, cut with a saw, from the same mine, intended to exhibit its utility as ballast, or for stowage in steam ships going long voyages. It is extensively used in the manufacture of iron.

[A gigantic specimen of this coal is placed outside the Exhibition Building. The southern part of the great central coal-field of South Yorkshire and the adjoining counties of Derbyshire and Nottinghamshire, is now much worked, and contains several valuable beds of coal, and rapidly entering into general use. The pits are from 300 to 500 feet deep.—D. T. A.]

JONES, SELLS, & CO., 55 *Bankside, Southwark*—Agents for the Proprietors.

A block and pieces of anthracite from the Gwaun Cae Gurwen Colliery, near Llanelly, South Wales; particularly adapted for use in kilns, in the manufacture of malt, and in drying corn. It is also adapted for use in close stoves, bakehouses, and wherever charcoal is used for heating or cooking, as it burns without smoke or soot. The seam from which the block is taken is 4 feet 6 inches thick.

PROTHERO & PRICE, *Tillery, Newport, Monmouthshire.*

Coal; a block weighing three tons.

DAVIS, DAVID, *Hirwain, near Merthyr Tydvil, Wales*—Proprietor.

The Blaengwawr steam-coal, from Aberdare.

FITZWILLIAM, Earl CHARLES WILLIAM, *Wentworth House, near Rotherham*—Producer.

Pillar, exhibiting a complete section of the Barnsley thick bed of coal, from the Elsicot colliery, and showing the different portions applicable for steam-engines and manufacturing purposes, and for domestic uses.

[The Barnsley coal is well illustrated in the Exhibition, as there will be found no less than three columns of it; two representing the whole thickness of what is called the thick bed, and the other from Silkstone, showing a beautiful variety of coal also found in the district. The situation of Barnsley, in the centre of the great coal-field of Yorkshire, and the abundance and quality of its coal, render it important among the inland towns producing mineral fuel. There are three principal varieties, viz., hard-stone coal, soft or tender coal, and Cannel. The iridiscent or peacock coal may almost be regarded as a fourth. The coal is worked long-wall method.—D. T. A.]

THE BRYMBO COMPANY, *Wrexham, Wales*—Producers.

Minerals, &c., found at Brymbo, near Wrexham, Denbighshire, or in the neighbourhood.

Main coal got at the Brymbo colliery.

[The Brymbo colliery is in a part of the Flintshire coal-field illustrated by the specimen of coal exhibited by Mr. Oakeley. There will be found a magnificent squared block of this coal in the enclosure beyond the western extremity of the building.—D. T. A.]

THISTLETHWAYTE, HENRY F., *The Vine House, Sevenoaks, Kent.*

A collection of gems and precious stones, chiefly illustrative of such as are used for personal ornament. The principal part of this collection was formed by Mr. Hertz, with a view to show the great variety of shades of colour in each species of stone, and to prove the connection of some classes; such as the corundum, where the tints of the ruby, sapphire, and topaz, are distinctly seen in the same stone. In the class of zircons and jargoons, the same connection of colours is exhibited. The specimens of diamond are interesting in point of crystallization as well as colour. The collection of pearls exhibit many varieties of colour both in the margarita and conch-shell specimens.

[The colours of certain minerals are extremely useful to the mineralogist in the determination of species, and are presented in great varieties in distinct series, but sometimes in very unconnected order. The most striking examples of series are found amongst gems, and are well illustrated in the collection described above, which is worthy of very careful observation and study.

The gems which best exhibit series of colours are diamond, corundum (oriental ruby and sapphire), topaz, emerald, garnet, and tourmaline. The zircons and jargoons are also remarkable, and highly interesting.

In most cases, minerals that are nearly allied, and are homomorphic, present similar series of colour; but in other cases, as in the diamond, the usual crystalline forms exhibit a more or less complex series in themselves. The principal colours of the gems are white, as opal, which is milk white; grey; black; blue, as some sapphires, which are Prussian blue, or the variety corundum, called ceylonite, which is indigo blue; green, as emerald; yellow, as topaz; red, as some zircons, garnets, ruby, &c.; and brown, as zircons.

The varieties of colour in pearls, extend from white and lead grey, through yellowish and pink, to black; the latter being, however, remarkable and rare exceptions, and the bluish or lead grey, being less valuable than more distinct tints. Some pearls exhibit much play of colour.—D. T. A.]

JAMIESON, GEORGE, 107 *Union Street, Aberdeen*—Proprietor.

Cairngorm stones from Cairngorm, Aberdeenshire, in the natural state, and cut into gems for jewellery.

Aberdeen and Peterhead granite, cut and mounted in brooches and other fancy articles, as buttons, studs, desk seals, pen-holders, &c.

A ram's head mounted in silver, as a snuff-box.

Scotch pearls found in the rivers Don, Ythan, and Ugie, Aberdeenshire. The shell from which the pearls are obtained.

[The Cairngorm mountain, one of those forming the granite nucleus of the Grampians, and rising to the height of 4,080 feet, is well known, and has been long celebrated for the fine quartz crystals of white, pink, dark brown, and black colours which take their name from it, and are found either in the cavities in the rock or the debris of rivers. Of these crystals, the deep yellow varieties, when well cut and set, are sold as topazes, and sometimes called Scotch topaz, while the darker varieties are called smoke topaz.—D. T. A.]

DINNEFORD & Co., 172 *New Bond Street*—Inventors and Manufacturers.

Specimens of magnesian minerals, and chemicals.

Samples of Dinneford's pure fluid magnesia.

[The principal minerals, of which magnesia forms an important part, are the sulphate (Epsom salts), the carbonate (magnesite), the silicate (meerschaum, talc and serpentine), and the carbonate of lime and magnesia (dolomite). From any of these may be obtained the hydro-carbonate much used in pharmacy (*magnesia alba*), and also the earth *magnesia* (prot-oxide of magnesium); but they are chiefly manufactured either from the carbonate or sulphate.—D. T. A.]

HIGHLEY, SAMUEL, JUN., 32 *Fleet Street*—Collector and Preparer.

Sulphur Minerals.

1. Native sulphur in rhombic crystals from Sicily.
2. Native massive sulphur.
3. Native earthy sulphur.
4. Iron pyrites, or sulphuret of iron, from Cornwall, &c.
5. White iron pyrites, from Littmitz, near Carlsbad.
6. Radiated pyrites, from the chalk of Surrey and Isle of Wight.
7. Cockscomb pyrites from Derbyshire.
8. Copper pyrites in crystals, from the Banat, &c.
9. Copper pyrites massive, from Staffordshire, &c.

Crude Sulphur of Commerce.

10. Crude Sicilian sulphur.
11. Crude drop sulphur.

Refined Sulphur.

12. Lump sulphur.
13. Roll sulphur.
14. Sublimed sulphur.
15. Sulphur vivum.

16 and 17. Sulphur precipitation, pure and (17) adulterated.

Crystallized Sulphur.

18. Crystals of sulphur from its solution in bi-sulphide of carbon.
19. Crystals from solutions of sulphur in camphine, made at temperatures varying from 77° cent. = 170·6° Faht. to 138° cent. = 280·4° Faht.
20. Crystals of sulphur deposited from sulpho-pentachloride of phosphorus.
21. Crystals obtained by the fusion of sulphur.

[Sulphur occurs native, in rhombic crystals; also massive with earthy and bituminous impurities, and occasionally with arsenic and selenium. It is generally found in volcanic districts and near hot springs in formations of various geological date. It occurs abundantly with iron and copper (iron and copper pyrites), and also with the common ores of lead, &c. It is used in chemical manufactures and in medicine; also for matches and gunpowder; and in preparing vermilion, sulphuric acid, vulcanised caoutchouc, &c. About 80,000 tons of crude sulphur are annually furnished from Sicily.—D. T. A.]

COWIE, A., & RAE, W., *Ellon, Scotland*—Proprietors.

Pearls from the river Ythan, Aberdeenshire.

ROCK, MARY, 6 *Stratford Place, Hastings.*

Ornamental stand, formed chiefly of a species of grass which grows on the cliffs at Hastings, and is used for ladies' work-baskets, table-mats, &c. The stand contains specimens of Hastings pebbles.

[The Hastings pebbles are from the calciferous grit of the Tilgate beds which form the "White Rock" of Hastings, but are often elsewhere seen in more tabular masses, resting on a very compact conglomerate, enveloping large rolled pebbles of variously coloured quartz, and jasper and smaller ones of pure white quartz and flinty slate.—D. T. A.]

DYER, WILLIAM, *Little Hampton, near Arundel*—Proprietor and Inventor.

Sussex coast agates, found on the sea-beach; many containing specimens of petrified sponges, sea anemones (*Choanites Königii*), and other zoophytes. Specimens fashioned and polished for ornaments.

Model of a mechanical contrivance for ventilating rooms and public buildings.

[The agates on the Sussex coast are, to a great extent, if not entirely, chalk flints in a peculiar state; and they frequently exhibit very beautiful indications of organic structure. The definition of agate generally in mineralogy has reference to an apparently banded structure, or concentric arrangement of silicious matter, often showing different tints of colour. When of considerable size, the central part is generally clear. The essential material is, in all cases, silica, and the colour is, no doubt, due to metallic oxides, chiefly of iron and manganese.—D. T. A.]

HOWARD, THOMAS C. E., *Bristol.*

Collection of sands, clays, building stones, marbles, coals, minerals, and metals, belonging to the Bristol basin. This district includes, in a comparatively small area, a wide geological range, extending from the Silurian rocks up to the oolites, with some alluvial and diluvial deposits. Maps and sections illustrative of the position and localities of the specimens are exhibited with them.

BREADALBANE, Marquis of, *Taymouth, Aberfeldy, Perth*—Producer.

Slates from the quarries of Easdale, &c., in Argyllshire.

Four squares of flooring, showing specimens of some of the woods grown in Perthshire and Argyllshire.

Table, chair, and chest of drawers, veneered with roots of the natural Scotch fir, dug from peat bog in the forest of Glenorchy, Argyllshire.

Specimens from the copper mine of Tomnadashin on the south side of Loch Tay, Perthshire.

Specimens from the silver-lead mine of Corriebuie, on the south side of Loch Tay, Perthshire.

Specimens from the lead mines of Tyndrum, Perthshire.

Chromate of iron, from the mine of Corriecharmaig, in Glenlochy, Perthshire.

Hæmatitic iron, from Glenquaich, Perthshire.

Rutile, or oxide of titanium, from the north side of Loch Tay, Perthshire.

Brown quartz, from Ben-Lawers, north side of Loch Tay, Perthshire.

Granite and porphyry, from the forest of Glenorchy, in Argyllshire.

Granite, from the quarries of Barrs and Inverliver, on Loch Etive, Argyllshire.

[The Easdale and other slate quarries of Argyllshire which have been worked for upwards of three centuries, employ about 200 men and boys, and export about 10,000,000 of slates annually, in about 300 vessels. The slates are not obtained generally in very large slabs, but most of the quarries supply a fair proportion of the larger kinds, used for roofing, and measuring 2 feet by 12 inches (Duchesses). They are worked in Easdale, Seil, and other small islands of clay slate, a little south of Oban, and near the large island of Jura. The quarries are of various dimensions; that of Ellenabeich being 300 feet long, 100 feet deep, and 150 feet broad, the quality improving in the depth. The other quarries are smaller; but those of Easdale are very valuable, and the quality excellent. The stratification of the beds of slate rocks is very much disturbed, but the cleavage is invariable, running N.E. and S.W., and dipping 50°.

The mineral produce of Perthshire, illustrated above, is obtained from systems of veins, some of which, running N.W. and S.W., contain copper ores of various kinds, with some ores of iron; and others, running N.N.E. and S.S.W., contain chiefly lead ore. The veinstone is generally quartz, and the ores include several interesting minerals.—D. T. A.]

LANCE, EDWARD JARMAN, *Frimley, Bagshot, Surrey.*

Specimens of minerals, in their raw state, as used in the arts (as iron from the Wealden formation, and the coal measures, &c.), arranged in trays, and named.

Specimens of minerals, used as manures, as phosphate of lime and magnesia; sulphate of lime and alumina; Cornwall sand, shell marl, &c.

Specimens of cultivated soils or earths, arranged as they occur from London to Cornwall, being the abrasions of minerals.

Specimens of corn produce; the effect of the admixture of fertilizing minerals and culture on silicious sand, in illustration of the preceding collection.

RICHARDSON, THOMAS WAKEHAM, *Brede, near Northam, Sussex.*

Specimen of silicious stone found in the parish of Brede, Sussex; useful for sharpening edge tools.

[The strata around Hastings, and extending to Brede, consist of the Hastings sand, which is the principal and middle formation of the Wealden series. Amongst the sands are beds of Tilgate stone, consisting of very hard sandstone, embedded in sand, and having, in some cases, a sub-crystalline structure. These are often used as whetstones, and are of good quality.—D. T. A.]

CASSELS, ALEXANDER, *Edinburgh*—Proprietor

Two curling stones used in Scotland in the national game of curling, made of the rock of Ailsa Craig, in the Firth of Clyde.

A specimen of the rock in the rough state.

The game of curling is practised upon ice during the winter. The Royal Caledonian Curling Club, of which His Royal Highness Prince Albert is patron, is composed of above 10,000 members.

[Ailsa Crag consists of a single rock of grayish compact felspar, with small grains of quartz, and very minute particles of hornblende. The height is stated to be 1100 feet, its length 3300, and its breadth 2200. On the east it rises by steps, but from the south, round by the west to the north, it is more perpendicular, and divided into columns. It rises abruptly from deep water, about 10 miles west of the coast of Ayrshire, and 15 miles south of the Isle of Arran.—D. T. A.]

GILL, WILLIAM EATHORNE, *Truro*—Inventor.

Normal guano, a manure: prepared from the refuse of the fisheries, as a superior fertiliser.

[The large quantities of fish, particularly pilchards, mackerel, and hake, which are caught around the coast of Cornwall, renders the preparation of a manure from the refuse, on most occasions, a comparatively easy undertaking. The value of fish manure has been long known, and it is not at all uncommon for farmers to go to considerable expense to obtain the offal from the nearest fishing towns; and they value highly the refuse salt, which they obtain after the pilchard season, from the curing-houses, on account of the great quantity of pot-oil it contains.—R. H.]

GLEIG, M., *Shetland.*

Various minerals.

[The Shetland islands consist chiefly of gneiss, penetrated by veins or dikes of porphyritic rock. Limestone bands occur in the gneiss, and magnesian rocks are found in the islands of Unst and Fetlar. In these, especially in the serpentine, chromate of iron is abundantly disseminated in granular particles, sometimes forming nodules weighing upwards of 1 cwt. This ore is the source of the pigments known as chrome yellow, &c. The other minerals, including copper ores, noble serpentine, asbestos, steatite, indurated talc, &c., are not so important. The rare mineral *Brucite* occurs in the serpentine of Balta Sound. It is a hydrous carbonate of magnesia.—D. T. A.]

BRODIE, PETER B., F.G.S., *Down Hatherley, Gloucester*—Producer.

1. Limestone, from the Purbeck strata in the Vale of Wardour, Wiltshire, applicable to purposes of lithography.

2. Ironstone, from the top beds of the lower lias, Robinswood Hill, near Gloucester, Hewlett's Hill, near Cheltenham, and Chipping Campden, Gloucestershire; it occurs in beds, and occupies a considerable area in the Cotswold hills.

3. Septaria, found in the upper beds of the lower lias, Robinswood Hill, near Gloucester, in sufficient quantities to be used for cement.

4. Iron pyrites, or sulphuret of iron, foun [illegible] a well in the lias at Gloucester.

5. Limestone, forming an extensive bed [illegible] lias near its base, and extending through Gl [illegible] and Somersetshire.

6. Hard limestone of the lower lias, nea [illegible] Warwickshire. This stone takes a polish, [illegible] used as a marble.

7. Bone bed, a thin [illegible] band a [illegible] the lower lias, charge [illegible] of [illegible] and coprolites, whicl [illegible] It occurs at Wainlode [illegible] Westbury-on-Severn, [illegible]

[All the above specimens, except the first, are from the lias, a deposit of calcareous clay widely distributed in the west of England, and ranging from the coast of Dorsetshire, at Lyme Regis, to the coast of Yorkshire, at Whitby. The upper and lower beds are often shaly, and yield materials for the manufacture of alum and other substances. The middle portion is more calcareous, and includes some bands of compact limestone. Where the carbonate of lime forms into nodules somewhat argillaceous, there are found septaria well adapted to the making of cement. In many places, the iron disseminated through the clay have collected into bands of impure ironstone, which, however, is not likely to come into successful competition with other ores. The bone-bed may, if the expenses of transport be inconsiderable, be worth working as a cheap and effective mineral manure.—D. T. A.]

GOULD, RICHARD, *White Street, Cork, Ireland.*

Samples of salt from rock salt pickle; manufactured by the exhibitor.

ROAKE, JAMES WHITE, *Newbury, Berkshire.*

Specimens of soils which surround Newbury, Berks, and the uses to which they are applied.

Nos. 1 to 4. Various clays. 5. White. 6. Red. 7. Yellow ochre. 8. Fine white sand. 9. Coarse sand. 10. Ferruginous sand. 11. Ochreous sand, used by iron founders. 12. Green sand, with oysters embedded. 13. Gravel, rough and pebbly. 14. Calcined pebbles, reduced to coarse and medium grit. 15. Fine pebbles, with stucco made from it, to compare with a coloured fragment and tessera from Herculaneum. 16. Chalk from Kintbury, with shells peculiar to that deposit. 17. Whiting. 18. Limestone. 19. Stone lime. 20. Chalk lime, through which gas has passed. 21. Peat from the Kennet valley. 22. Peat, condensed by Cobbold's patent process. 23. Peat, pulverised for horticultural uses, and disinfecting purposes. 24. Peat ashes, for the agriculturist.

Samples of bricks, tiles, and pottery.

[Newbury is situated on the lower tertiary beds immediately overlying the chalk, which crops out at a short distance from London to the north, south, and west. The river Kennel crosses the chalk from the west, runs through the town towards the east, and enters the Thames near Reading. The tertiary deposits here include a moderate thickness of the London clay overlying the mottled clays and sands of the lower or plastic clay series, including a pebble bed, mottled red clays and sands, and the whole covered up with a little gravel.—D. T. A.]

RELF, S., *Reigate, Surrey*—Producer.

White sand, from the Tunnel Caves at Reigate (called in use "silver sand,") dug from the rock.

ROCK, JAMES, jun., *Hastings.*

Lignite found in the summit tunnel of the Hastings and Ashford railway, 1¼ miles to the N.N.E. of Hastings, about 90 feet from the surface, and 300 feet above the sea level. The strata dip from N.W. to S.E. at an angle of about 65 degrees.

Clinker, containing a considerable quantity of iron, from an ancient cinder-bank on the property of Hercules Sharpe, Esq., Sedlescomb, Sussex.

Claystone, said to contain oxide of chromium.

Fine white sand, from Hastings cliffs.

[The lignite of the Hastings sand formation, near Hastings, has been long known, and corresponds in every particular with other lignites from Tilgate Forest. It occurs in nearly horizontal bands, thinning out into a mere film, and the largest masses do not exceed a few inches in thickness. It is very brittle, and burns with a flame; resembles jet, and contains included fragments of ligneous character. It is not unlike the Bovey coal.

Ironstone was formerly extracted from some of the ferruginous sands of the Wealden, either in irregular concretions, hard, compact, and of steel-grey colour inside, or laminated, and often concentric. In some places it is of excellent quality, and when the country was covered with forest was much used in the manufacture of charcoal iron.—D. T. A.]

NIXON, Rev. ALEXANDER, *Nathfield, Dunfanaghy, Donegal, Ireland*—Producer.

Steatite—from the Conyingham-Denison property; found in large masses on the seashore.

Slate (found within eight feet of the surface) from Ballyboes quarry, recently opened.

Sand, from Muckish mountain, within five miles of Sheephaven on Ballyness. A pure silicious sand producing a clear flint glass.

INGLIS, JOHN, *Smerick, by Buckie, Banffshire, Scotland*—Proprietor.

Relics of antiquity, being two pieces of flint, finely polished, and brought to thin edges at their ends. Found by the exhibitor 15 inches below the surface of the ground, and two feet apart, on his farm, in a yellow clay subsoil.

FLATHER & HADEN, 1 *Castle Mills, and* 2 *Broad Lane, Sheffield.*

Prepared Trent sand, or wharpe, used for buffing up, or bringing to a surface, German silver, Britannia metal, brass, copper, &c.

Prepared Welsh rotten-stone, used for producing the fine polish on silver, Britannia metal goods, &c.; when mixed with one-sixth its weight, of rape or sweet oil, it forms the polishing paste used for cleaning Britannia metal, brasses, tin ware, and other bright metal goods.

[Most substances employed under the name of rotten-stone, or Tripoli, are essentially composed of silica in a peculiar state of subdivision, the actual particles of which the whole is made up being crystalline, but the mass earthy, and often reduced by compression to a solid state, having a slaty fracture. In most cases, the origin may be traced to the remains of infusorial animalcules, and occasionally the presence of carbon, and a little resinous organic matter which shows this still more clearly. The name Tripoli is generally understood to apply to all the earthy varieties (of which there are several) in which silica exists nearly pure, but in a very minute state of subdivision. Rotten-stone is limited to those which are light and friable, and of very fine grain. It occurs rather abundantly near Bakewell, in Derbyshire, amongst the carboniferous limestones, but is often met with in other rocks.—D. T. A.]

Prepared lime, used for producing the bright black polish upon German silver, electro-plated, and silver goods.

CAWLEY, JAMES, *Pendell, Bledingley*—Producer and Manufacturer.

Stone from the surface of fuller's earth, used for building purposes.

Fuller's earth in the raw state, blue and yellow.

Fuller's earth, blue and yellow, dried and prepared for use in the manufacture of woollen cloths, flannels, blankets, Scotch tweeds, and tartan shawls.

Specimen of the spar found in the strata of the fuller's earth.

All the above specimens were found and dug at Mr. Cawley's pits at Nutfield, Surrey.

[The fuller's earth pits of Nutfield, near Reigate, are extensively worked, and supply large quantities of this substance to the clothing districts. There are two kinds, one greener than the other, owing to the presence of silicate of iron; but both exist under the same geological conditions, occurring in the lower cretaceous series, and differing little in chemical condition.

Fuller's earth consists of about 45 silica, 20 alumina, and 25 water. When placed in water it almost dissolves, and when exposed to great heat it melts. It combines readily with grease, forming a kind of earthy soap, and for this reason is valuable in the manufacture of cloth made of animal fibre.—D. T. A.]

GAWKROGER & HYNAM, 7 *Princes Square, Finsbury*—Manufacturers.

Fuller's earth, and purified dried fuller's earth, from Chart Lodge, Reigate, Surrey, and Cormonger's Pits, Nutfield, Surrey.

[Fuller's earth, and its localities in England, are elsewhere described. The following is the mode of purifying and preparing the raw material for use:—

The fuller's earth, after it comes from the pit, is baked or dried by exposure to the sun, and then thrown into cold water, where it falls into a powder, and the finer parts are separated from the coarser by a method of washing in several tubs, through which the water is conducted, and where it deposits the different kinds in succession. These are used for different kinds of cloth, the coarser part for the inferior and the fine for the better kinds of cloth. The soapy combinations formed by fuller's earth with the greasy portions of cloth during the process of fulling, are supposed to serve the purpose of mordants in some measure.—D. T. A.]

LEE, JOHN, LLD., *Hartwell, near Aylesbury*—Proprietor.

Samples of fine washed sand, from a sand-hill in the parish of Stone, near Aylesbury.

White, yellow, blue, and green glass prisms, made from the same.

Two spheres of white glass, made from the same sand.

[These sands are from soft beds of the Lowes greensand series, of which there is a considerable thickness, forming a knoll at Stone. There is about 8 feet of whitish sand below 7 feet of sand and sandy clay, containing impure fuller's earth. The lower green-sand terminates a little to the west, and is succeeded by the beds of Portland stone, forming a distinct ridge near Hartwell, but covered and obscured by beds of gravel.—D. T. A.]

RIDDELL, Sir JAMES MILES, Bart, *Strontian*—Proprietor.

Various specimens of minerals.

Harmatome, in large crystals, on calcareous spar.

Morvenite, a variety of harmatome, on calcareous spar, amber colour.

Crystallized calcareous spar, with annular iron pyrites, enclosing radiated sulphate of barytes.

Brown calcareous spar.

Crystallized calcareous spar, of a pink colour.

Calcareous spar, on hexahedral tables enclosing icositetral crystals.

Hexahedral prismatic calcareous spar, penetrated with crystals of the same, of a different form, the obtuse solid angle of which partly protrudes from the terminal plane of the prism.

Brewsterite, discovered near Strontian.

Crystallized carbonate of strontian.

Massive fibrous carbonate of strontian, with heavy spar.

Sulphate of barytes with phosphate of lead.

Sulphuret of iron.

Gneiss. Gneiss passing into granite. Gneiss with re[illegible] felspar.

Junction of gneiss with granite, intersected by a vein of felspar.

Fine-grained granites. Syenites

Porphyritic granite.

Syenite, with a vein of felspar.

Rock, of carbonate of lime and serpentine.

Granite studded with garnets, from the summit of Ben Resipole, a mountain above 3,000 feet in height.

A very large specimen of the same.

Quartz rock.

Sulphuret of lead, in a matrix of calcareous spar, from the Smithy Vein (Feedonald district).

Sulphuret of lead with calcareous spar, a continuous string of lead ore, from the red vein of Feedonald.

Crystallized sulphuret of lead (the primary cube), from the same vein.

Sulphuret of lead, with sulphuret of zinc and crystallized calcareous spar in the cavities.

Sulphuret of zinc and calcareous spar, from Corantee.

Cubic sulphuret of lead with calcareous spar.

Sulphuret of lead in calcareous spar, from Clashgoram mine (middle district).

Sulphuret of lead; sulphuret of lead, embedded in calcareous spar; and sulphuret of lead, partly crystallized with calcareous spar—from Belsgrove Mine.

Junction of granite and mica slate.

Lias limestone; from the north side of the promontory of Ardnamurchan.

Lias limestone, from the south side of the promontory.

A large mass of sulphate of barytes, a substance constituting much of the matrix or veinstone of lead ore.

[At Strontian, in the western part of Argyllshire, a boss of granite is seen penetrating the gneiss, which abounds in the district; and a little further to the west, a large quantity of porphyry and trap occurs, covered, in two or three places near Ardnamurchan, by deposits of the oolitic and liassic period. In the granite, and near its junction with the gneiss, mineral veins are found, containing lead and copper; and in one of these was first observed the mineral thence called *strontianite*, or *strontites*, a carbonate of strontide, usually associated with calc-spar, sulphata of barytes, and galena. The metal called *strontian*, obtained from this mineral, was first described by Sir H. Davy, and resembles barium in its properties and appearance. Carbonate of strontia is chiefly used in the production of the nitrate employed in giving a red colour to fireworks.

Harmotome and morvenite are hydrous silicates of alumina and barytes. Brewsterite is also hydrous silicate of alumina, but contains strontia, as well as barytes. The other minerals are well known. The lias is one of several small patches round the trap rocks of Ardnamurchan, Morven, and the Isle of Mull, and contains numerous organic remains.—D. T. A.]

MORRISON, GEORGE, Agent of Earl Somers, *Reigate.*

Sand from the common, named Reigate Heath, valued for its grit, and used in the manufacture of glass.

[This sand is from certain beds of the lower greensand series much developed in Surrey, and frequently exhibiting extensive tracts of sand, often without admixture of any argillaceous or ca[illegible] matter.—D. T. A.]

Sq[illegible] *of*

S[illegible] of

JENKINS & BEER, *Truro*—Producers.

Ochres, three in a powdered state, of different shades of colour, and one in lumps of two shades of colour; produced at Kea, near Truro; used in the manufacture of paints, paper-hangings, &c. Exhibited on account of their clearness, fulness of colour, body, and cheapness.

GORE, CHARLES WILLIAM, *Moreton-in-Marsh*—Proprietor.

Brown ochre, in its raw state, used for staining and for common purposes. In its raw state it is a stone colour, and is used for houses, glass-houses, &c. When calcined, it is of a deep brown colour, and is used for facia, iron-work, &c.; it has a strong grit, and requires the use of machinery to pulverize, grind, and prepare it.

ROSS, THOMAS, *Claremont, Hastings.*

Iron ore from the neighbourhood of Hastings.

Tilgate stone from the East Cliff, Hastings.

Hastings "granite" (locally so called).

Clay, from a large bed lying under the sand cliffs to the eastward of Hastings.

Hastings hone-stone, rough and prepared.

[The clay near Hastings underlies a thick deposit of white sand and friable sandstone, called the "Worth beds." The clay itself contains undulating seams of lignite. It overlies another bed also including lignite.—D. T. A.]

ROGERS, SAMUEL SANDILANDS, *Douglas, Isle of Man.*

Specimens of the earths and sands of the Isle of Man.

POTTER, WILLIAM, & Co., 87 *Aldgate, and Cromford, Derbyshire*—Proprietors and Manufacturers.

Specimens of fluor spar, calcareous spar, calamine, white-lead ore, lead ore, sulphate of barytes, and sulphate of barytes manufactured as a pigment. From the Dinah, Goodluck, and other mines in the vicinity of Cromford, Derbyshire.

HILL, JOHN, *Ringsend, Dublin*—Manufacturer.

Basket and pink salt for table use; Irish fine, or butter salt, and coarse or provision salt.

[There are no natural deposits of salt in Ireland, and the various kinds exhibited by and prepared in that country are generally procured from the English salt mines.—D. T. A.]

ROUSE, Capt. & G. N. SIMMONS, *Truro.*

Specimens of sands, from various parts of Cornwall, used for agricultural and building purposes: the agricultural sands from Gwithian, Falmouth harbour, and Perran Porth; the others used for building purposes.

COLLINSON, CHARLES, *Mansfield*—Proprietor.

Red casting sand, found only at Mansfield, and of value in the production of fine castings. Its qualities are fineness of grain, porosity, great purity and smoothness, which latter property contributes to give a high face to castings.

BROCKEDON, WILLIAM, 29 *Devonshire Street, Queen Square*—Patentee and Manufacturer.

Native plumbago:—Samples from the mines of Borrowdale in Cumberland, fine and crude: from Ceylon, Davis' Straits, Spain, Bohemia (called Mexican), Greenland, California, France (Poligny): nodules from India, &c.

Samples of Cumberland black lead, prepared for condensing into blocks by patent process.

Specimens in powder, purified from grit, and in fine powder, ready for condensing, which has passed through apertures $\frac{1}{50000}$th of an inch in diameter.

Blocks which have been condensed by a pressure of 5000 tons.

Slices of the blocks for pencil-makers; points for Mordan's ever-pointed pencils; cedar pencils, by various makers of Brookman's patent Cumberland lead.

Blocks made of Ceylon and other plumbagos, &c.

The plumbagos exhibited in their natural state, are—Three very fine samples of the old black-lead, formerly found in Cumberland. The only native plumbago which could be cut into slices, and used in its natural state; the miners have long failed to supply such specimens. Two samples of Cumberland lead, containing too much grit to be used without purification. Samples of plumbago from Ceylon, crystalline and fibrous: this is the purest plumbago known, being 98·55 pure carbon; but it is too fragile for use in cedar. Two samples from Davis's Straits and Greenland. One from California. Others from Spain and Bohemia (called Mexican), of these two the common pencils are made, when hardened by sulphur. From none of these can a fine pencil be made, but the Cumberland.

The manufactured blocks are from the second variety of the Cumberland, freed from grit, and reduced to an impalpable powder, of which a quantity is shown to form one of the blocks. From this powder the air is exhausted, when it is condensed in a dry state by an enormous pressure, which consolidates a mass weighing seven ounces under a force, in two blows, of 5,000 tons, leaving it as compact as the natural; and from these blocks slices are cut, as shown: these are inserted in channels in the cedar. It is also cut into the lengths of the block as square threads; these are rounded, then cut to the proper lengths for the ever-pointed pencils.

For the process by which the Cumberland lead can be freed from grit, and then solidified, the exhibitor obtained a patent, and pencil manufacturers use it only for their finest drawing pencils.

[Graphite or Plumbago, a form of carbon commonly called *black-lead*, and sometimes, but incorrectly, regarded as a carburet of iron, is a well-known soft mineral, crystallized in small hexagonal plates of laminated structure, infusible, burning with great difficulty under the blowpipe, consisting of from 85 to 8·35 per cent. of carbon, and having a specific gravity of 2·09 to 2·25; the purest being the lightest. It is found in metamorphic, generally in schistose, rocks, of various geological age, in masses or veins parallel to the lamination or stratification. The pure and valuable kinds are very rare, and have been obtained almost exclusively from the localities mentioned above. The variety from Ceylon is remarkably pure but soft; that from Greenland is also pure, but very hard. The latter, according to an analysis recently made by T. H. Henry, Esq., yields carbon 96·6, ash 3·4; but does not seem adapted for use in pencil-making, owing to its hardness and paleness. It appears that the presence of a certain quantity of iron is favourable for its use in the arts.

The method by which Mr. Brockedon has rendered several of the softer and less compact graphites available, and has also brought into use the fragments formerly too small for pencils, is by enormous compression, produced by powerful machinery, on the finely-levigated powder in a pure state, after a certain amount of preparation.—D. T. A.]

REEVES & SONS, 113 *Cheapside*—Inventors and Manufacturers.

Cumberland lead and cedar wood, in the different forms in which they are used in the manufacture of drawing pencils.

Water colours, in various forms, prepared with a medium of pure wax, in lieu of gum, in order to produce permanency, brilliancy, and easy application.

SOLOMON, THOMAS, *Truro.*

Varieties of hone-stones, used for sharpening edge-tools, from Perran Porth, near Truro; Lostwithiel; Feock, near Truro; Kenwyn, near Truro; and other localities.

Wolfram, from various tin-mines in Cornwall, used as a mordant in dying calicoes.

Varieties of rarer minerals, from various parts of Cornwall.

DYER, WILLIAM BUNT, *Mold*—Proprietor.

White lead ore, carbonate of lead ore, from Jamaica mine. Assay, 60 per cent. for lead, and four ounces of silver per ton of lead.

FAYLE, BENJAMIN, & CO., *Old Swan Lane, Upper Thames Street*—Proprietor.

Specimen of blue potters' clay, as dug from the pits at Norden, Isle of Purbeck, county of Dorset; used for the manufacture of earthenware; said to possess greater strength of body, and to shrink less than many other clays when exposed to high heat.

KING, GEORGE, *Demidge Lodge, Gazeley, near Newmarket*—Manufacturer.

Red brick earth as dug from the pit. Red building bricks, pamment bricks, and coping bricks made from the earth.

MICHELL, SARAH, *St. Austell*.

White china clay, for manufacturing china and earthenware, also for bleaching paper, calico, &c.

FISHER, FREDERICK, *Woolpit, Suffolk*—Manufacturer.

Specimens of Woolpit brick-earth.

White building bricks.

Pamment bricks and draining pipes.

SIMONS, THOMAS, *Birmingham*—Manufacturer.

Specimens of raw and burnt clay:—Lumps of glass-house pot, rough, and fit for use. Lump of coke and finer. Casting pot, &c., in different stages, and finished. Muffles, &c. Portable furnaces for chemists and others. Glass-house pot. Stove liners. Retorts. Crucibles.

DEERING, JAMES, *Middleton, Cork, Ireland*—Producer.

Various materials obtained at Rostellan, county of Cork, Ireland, adapted for use in the manufacture of the better kinds of porcelain and earthenware. These include samples as raised from the mine, which was opened in 1850, and the different substances as used in the arts, and articles of earthenware and glass, manufactured from them.

FAHIE, JAMES K., *Tipperary, Ireland*—Producer.

Copper ore, found on Lord Stanley's property, near Tipperary, and from Hollyford.

Lead ore, found at Oola, near Tipperary.

Minerals from several parts of the country.

Anthracite coal, from Killanaule.

Building limestone, found near Tipperary.

Black and white marble, found at Mitchelstown, county Cork. Red and grey marble, found at Cloyne.

Hydraulic limestone, found near Tipperary; a natural cement, produced in powder and biscuit.

Artificial cement, prepared from chalk, alluvium, and pit clay; and stucco, for interior work; prepared from gypsum found in a limestone quarry near Tipperary.

White clay, in its rough state, found near Caher, and prepared in biscuit and small bricks, used for stone ware and pottery. Black clay, in its rough state, found at Killanaule. Black fullers' clay, found near Caher, in a stratum over white clay.

Felspar, from Lord Kingston's cave, county Cork.

Draining tiles and pipes, made on Lord Stanley's property, near Tipperary.

Sands, white silica, found at Killonan, useful for heavy iron castings and other purposes. White silica, found near Caher, used for pottery, &c. Manganese, found at Springhouse.

Inorganic vitreous matter, the produce of green ash and elm, calcined in a brick kiln by the exhibitor.

Irish laburnum candlesticks. Boxes and shoes of the same wood.

Black oak vases, and cluster of carved vines; door and window furniture.

Water, from a well in the rock of Cashel, lately discovered, about 150 feet above the general level of the surrounding surface.

BROWNE, WILLIAM, *St. Austell*—Proprietor.

Specimen of china clay, derived from the decomposition of felspar, extensively used in the manufacture of china, porcelain, and Parian, for ornamental vases, busts, and all articles that require particular care and delicacy in moulding, and (by a recent patent) to be employed in the manufacture of ornamental stone, facing, flooring, and tiling, various articles of furniture, &c.

[A very large quantity of valuable china clay and china stone are found naturally and prepared artificially in Cornwall and Devon, chiefly from the St. Austell decomposing granite, and the southern granite of Dartmoor. About 14,000 tons of prepared and 30,000 tons of natural china clay are annually exported, chiefly to the potteries. —D. T. A.]

One of a series of reports published monthly, containing a description of the duty performed by the steam-engines used in the mines of Cornwall and Devon.

The various engineering details of the engine and its work are given in these reports on a new method.

MARTYN, ELIAS, *St. Austell*—Producer and Manufacturer.

Specimens of China clay, or kaolin, used in the Staffordshire potteries, in bleaching, and in paper making. China stone.

MARTIN, REBECCA, *Higher Blowing House, St. Austell*—Producer.

Porcelain or china clay, natural, and as prepared for the market.

Silicious sand, used in the manufacture of glass and china stone, and in glazing and enamelling earthenware.

COWPER, JOHN, *Alston, Cumberland*—Proprietor.

Sulphate of barytes, a large crystal from Dunfell, Cumberland.

Witherite (carbonate of barytes) from Fallowfield, Northumberland.

Sulphate of barytes, found in witherite.

Bromlite (baryto-calcite) on bitterspar and pseudomorphous quartz; from Brownley Hill, Alton, Cumberland.

Carbonate of barytes, from Fallowfield, Northumberland; used in the manufacture of plate, crown, sheet, and bottle glass, chemical works, &c.

Barytes and galena, from the same quarter.

Coal, galena, shale, &c.

Carbonate of lime, from Alton, Cumberland.

GREAVES, R., *Warwick*—Proprietor and Producer.

Blue lias limestone, with samples of the lime in the lump and ground.

Models in lias, Portland, and improved Roman cement.

Blocks of concrete, made in lias, Portland, and Roman cement, and ground-lias lime.

Brick-work cut from the Copenhagen tunnel in the Great Northern Railway, and set in lias lime. Ornaments cut and set in the same, to show the adhesiveness of the mortar.

Lias flag-stone, adopted for hall, church, and house-floors, being hard and dry.

Lithographic stones.

Quilliam & Creer, *Castletown, Isle of Man*—Producers.

Slabs of Poolvash black marble, inlaid with red and yellow composition, to imitate encaustic tiles.

Plain polished slab of Poolvash black marble.

Table of Poolvash grey shelly marble, with encrinital column.

National tile one foot square. Poolvash black marble, with the arms of England, Scotland, Ireland, Wales, and the Isle of Man, in figures inlaid in red.

Slab of black marble, for chess table, inlaid with various marbles of the Isle of Man.

Marble candlesticks.

Wreath of flowers in Poolvash black marble.

Cumming, Rev. Joseph George, *Castletown, Isle of Man.*

Black flagstone (Posidonia schist), from Poolvash, Isle of Man. Exported from Castletown. The quarries have been wrought upwards of 200 years. The steps of St. Paul's Cathedral are from these quarries; they were presented by Bishop Thomas Wilson. Used largely for flooring, chimney-pieces, tomb-stones, and, as suggested by the exhibitor, inlaid with a red composition to imitate encaustic tiles. Easily and economically wrought.

Grey marble (encrinital and shelly limestone), from Poolvash. Exported from Castletown. Used for tables and chimney ornaments.

Black marble (lower carboniferous limestone), from Port St. Mary, Isle of Man. It is hard and durable, and takes a good natural polish; raised in blocks and flags of great size. Used for piers, floorings, tomb-stones, and burnt into a strong lime.

Pale marble (carboniferous limestone), from Scarlett, Isle of Man. Exported from Castletown. Castle Rushen (900 years old), King William's College, St. Thomas's church, Douglas, and Castletown pier are built from these quarries. It is durable, and easily raised.

Spanish-head flagstone (clay schist). It is exported from Port St. Mary, used for lintels and gate-posts, and in ancient times for Runic monuments, and is durable and slightly elastic in thin flags, and can be raised in squares of 16 feet each way.

Peel freestone (old red sandstone), from Craig Mallin, Isle of Man. Exported from Peel. A large portion of Peel Cathedral was built of it in 1226.

Granite, from South Barrule, Isle of Man. Quarries lately opened, and the church of St. John built from them. Old fonts on the island, were formed from boulders of this granite. Exported from Douglas, Peel, and Castletown.

Porphyritic greenstone, from Langness, Isle of Man. Good road material. May be obtained and shipped in any quantity at Derby haven.

Hæmatite. Iron ore from the glebe vein, Maughold, Isle of Man. Exported from Ramsey.

White carbonate of barytes, from the Cross vein, South Barrule. A vein 5 feet thick, but not raised for the market.

All the quarries on the island belong to the Crown.

[The different building and road materials, above referred to, will be found to present some rocks of considerable interest, hitherto little used for economic purposes. The marbles and other calcareous rocks are all from the carboniferous limestone, and entirely confined to the southern extremity of the island, near Castletown, where they occupy about 16 square miles, for the most part covered by tertiary gravel. The sandstones, schists, and granites are more abundant, but less valuable.

Of the calcareous rocks, the black flagstones of Poolvash contain much carbon and some argillaceous matter, and are very durable. The different marbles have the same properties as the carboniferous limestones of Derbyshire; and the porphyritic rocks are generally of good quality.—D. T. A.]

Foot, John, *Abingdon Street, Westminster*—Proprietor.

Specimens of Best Bed Portland stone, and Whit Bed Portland stone, showing different samples of workmanship.

Specimens of Roach Portland stone.

The backs show natural fractures.

Freston, William, *Hawthorn Cottage, Stroud.*

Building-stone from Painswick Quarries; from Sheepscombe, and from Nailsworth Quarries.

Voss, James, *Woodyhide, Corfe Castle*—Proprietor.

Purbeck marble, from quarries at Woody-hide, Corfe Castle, used in decorating the interior of the Temple Church, London; also used for dairies, hall tables, mantelpieces, &c.

[The Purbeck series of beds occurs at the base of the Wealden formation, and immediately overly the Portland series. It is best developed in the Isle of Purbeck, where it has a thickness of 275 feet, 55 feet of the upper part of which is useful stone. The beds called Purbeck marble consist, for the most part, of small *paludinæ*, cemented by carbonate of lime with much green matter. Other beds are composed of bi-valves of the genus *Cyclas*. They are all used for building purposes.—D. T. A.]

Gelling, Frederick Lamothe, *Castletown, Isle of Man*—Producer.

Marble, obtained from Coshnahawin and Skillicore, in the parish of Malew, Isle of Man, exhibited in several forms, to show its capabilities—in the rough, with one face polished; table in five pieces; turned specimens; a vase, &c. It can be raised of large size, and of great variety.

Red porphyry, and agate or pebble, with polished faces.

[The limestone of Skillicore and Coshnahawin is of the carboniferous period, and is broken up into rhomboidal blocks, the intervals being often filled with quartz. The rock exhibits a beautiful variegated appearance, but is too much fractured, and appears to be too hard to be worked with profit as a marble.—D. T. A.]

Gowans, James, *Edinburgh*—Proprietor.

Group in freestone, designed and executed by A. Handyside Ritchie, 92 Princes Street, Edinburgh.

This stone is from Redhall quarry. According to the analysis of Dr. George Wilson, of Edinburgh, the average percentage of peroxide of iron is not more than ·052. It is said to possess the property of hardening by exposure to the weather, and of retaining its primitive surface.

Specimen of freestone, from Binny quarry, forming the plinth of the group.

Dr. Wilson, in his analysis, says, "This building stone which has been in use for many years in Edinburgh, has been analysed by me, and found to contain the same percentage of peroxide of iron as the Redhall freestone, and I find that it exhibits the peculiarity of having diffused through it a quantity of native bitumen or asphaltum which acts as a protective varnish to the stone, and defends it from the action of the atmosphere."

Specimen of Binny quarry bitumen candles, made from the nearly solid bitumen or mineral wax, which is diffused through the stone, and exudes in considerable quantity between its layers. Owing to its abundance, the workmen use it for domestic purposes.

Specimen of bitumen from Binny quarry, in its natural state. It has been found by Dr. Wilson to yield, on distillation, paraffine, and a liquid hydro-carbon analogous to naphtha.

Model of a steam crane, with travelling gear, worked from a horizontal shaft, and capable of raising 20 tons.

Drawing of a steam crane, worked by crab gearing, attached to a horizontal steam-engine, and capable of raising 50 tons.

Drawing of a boring machine, capable of boring holes to a depth of 40 or 50 feet; from 3 to 6 inches in diameter.

Specimen of bitumen used in conjunction with a galvanic battery for separating the large masses of rock in the quarry. It is stated that masses weighing upwards of 6,000 tons have been dislodged by this operation from their beds. It is proposed to apply the same method to the working of coal-mines, blasting of submarine rocks, &c.

GUILLAUME, GEORGE, *Southampton.*

Specimen of stone found in Hampshire, adapted for ornamental use.

JENNINGS, BENJAMIN, *Hereford*—Proprietor.

Specimen of sandstone, from the Three Elms Quarries, near Hereford. Exhibited on account of its strength and durability; it is said to stand equally well on its edge or on its bed; and to be suitable for cider mills, sea walls, railway purposes, &c.

KIRK & PARRY, *Sleaford, Lincolnshire*—Proprietors.

Specimen of Ancaster stone, of the lower oolite formation, from the quarry at Wilsford, near Sleaford, Lincolnshire. It is said to be a durable building material, used chiefly for dressings and architectural decorations, and adapted for sculpture and ornaments of various kinds. It rises in beds, varying from 10 to 24 inches in thickness: the texture is close and uniform; and it is stated that although it can be cut with an ordinary peg-tooth saw, like the Bath oolite, it will carry an arris equal to that of Portland stone.

[Ancaster stone is a fine cream-coloured oolite, cemented by compact, and, often, crystalline carbonate of lime. There are numerous beds, the entire depth of workable stone being 13 feet, and blocks of 3 to 5 tons being obtainable. The stone weighs 139 lbs. 4 ozs. per cubic foot; absorbs very little water; cohesive power tolerably high; composition—carbonate of lime 93·6, carbonate of magnesia 2·9, with a little iron and alumina, and a trace of bitumen. Belvoir Castle, Belton House, and numerous mansions and churches in Lincolnshire are constructed of this stone.—D. T. A.]

LINDLEY, CHARLES, *Mansfield*—Proprietor.

Twelve-inch cube of magnesian limestone, or dolomite, from the Mansfield Woodhouse Quarries, re-opened 1840, after a lapse of several centuries, to obtain the supply of stones for the erection of the new Houses of Parliament at Westminster. Chemical analysis:—Carbonate of lime, 51·65; carbonate of magnesia, 42·60; silica, 3·70; water and loss, 2·05. The débris is largely used for the production of carbonic acid gas and Epsom salts.

White calcareous sandstone. Chemical analysis:—Silica, 51·40; carbonate of lime, 26·50; carbonate of magnesia, 17·98; iron alumina, 1·32; water and loss, 2·08.

Red calcareous sandstone. Chemical analysis:—Silica, 49·4; carbonate of lime, 26·5; carbonate of magnesia, 16·1; iron alumina, 5·2; water and loss, 2·8. From quarries which have been in work for four hundred years.

These two sandstones are the connecting link between the magnesian limestone and the new red sandstone formations, partaking of the characters of both.

[The magnesian limestones, valuable for building purposes, are chiefly or entirely those which present equal proportions of carbonate of lime and carbonate of magnesia in a semi-crystalline state. Such stone has a peculiarly pearly lustre when broken, but its colour, when worked, is light yellowish brown, not changing by exposure. Its specific gravity is very high, the stone weighing upwards of 150 lbs. the cubic foot. The cohesive power is exceedingly great, and hardly rivalled by any limestone.—D. T. A.]

POWELL, FREDERICK, *Knaresborough, Yorkshire*—Collector.

Building stones, from quarries in the immediate vicinity of Knaresborough.

RUTHERFORD, JESSE, Stone Merchant, *Wingerworth, near Chesterfield*—Producer.

Stone from Wingerworth quarry, near Chesterfield, Derbyshire.

Stone from Lion quarry, Wooley Moor, near Wingerworth, Chesterfield.

Stone from Bramley Fall quarry, Wingerworth, near Chesterfield: this stone is generally used in heavy works such as docks, bridges, &c.; the quarry has been known upwards of 500 years; the stone is obtained in blocks 45 feet long, 20 feet broad, and 16 feet thick, each block weighing about 1000 tons.

[The Bramley Fall stone is a light ferruginous brown sandstone, with an argillo-calcareous cement and very little mica. It weighs 142 lbs. 3 oz. to the cubic foot.—D. T. A.]

SPARKS, W., *Crewkerne*—Collector.

Specimens of stone from the counties of Dorset, Somerset, and Devon:—

Greensand, a silicious stone, from Blackdown Hills, Devon, used as a whetstone for scythes, &c.

Purbeck marble; Purbeck stone; Portland stone. Building stone from Ridgway; and limestone from Langton Herring, near Weymouth.

Building stones, white and calcareous, from Bothenhampton, near Bridport, and Beaminster, Dorset; also from Bath, Doulting, near Wells, and Crewkerne, Somerset.

Ferruginous stone, for public buildings, mill-dams, &c., from Hamdon Hill, Somerset.

Blue lias limestone, for docks, railways, &c., from Lyme Regis, Dorset, from Curry Rivell, near Langport, and from Keinton, Somerset.

White lias, from Beer Crowcombe, and from Tiverton, Somerset. Gypsum, from the former place.

New red sandstone, from Bishop's Lydiard, near Taunton, Somerset.

Millstone grit, for paving, &c., from the Pennant quarries, Hanham, near Bath.

Carboniferous limestone, from St. Vincent's rocks, Clifton; from the Breakwater quarries, Plymouth, from Newton-Abbott; and from Kingskerswell, near Torquay, Devon.

Granite, from Dartmouth, Devon, used for Government works, Stonehouse.

[Many of the stones referred to in the above list are of considerable value and interest. The whetstones first alluded to are manufactured from hard sand concretions, found in the lower cretaceous rocks on the west part of the Blackdown hills, and quarried from galleries driven as much as 300 yards into the hill side. These concretions vary from 6 to 18 inches in diameter, and form a bed about 4 feet thick, available for scythe-stones. The beds above and below are employed for building purposes.

The inferior oolites, worked at Crewkerne as building stones, are not specially remarkable for excellence, but the Ham hill stone is durable and valuable. The Pennant grit is a rock much employed for building and engineering purposes, and belongs to the coal measures.

The granite of Stonehouse and Dartmoor is a valuable and durable material.—D. T. A.]

STAPLE, THOMAS, *Stoke-under-Hamdon, near*
—Producer.

Blocks of Ham-hill stone (oolite), partially pr
show the quality of the stone.

DRIVER, WILLIAM, 4 *Lyon's Inn, Strand, Middlesex*—Producer.

Specimens from the Chevin stone quarry, Otley, Yorkshire.

STOCKS, MICHAEL, *Shebden Hall, near Halifax*—Proprietor.

Specimens of ashlar building stone, from the Shebdenhead quarries, near Halifax. The seam from which the specimens are obtained is between the lowest, or "Halifax beds," and the "Lowmoor beds" of coal; and between the lowest of the latter, or "better bed" coal, and the Northowram flag-stone. The Halifax beds of coal immediately overly the millstone grit.

[The coal grits of Yorkshire supply a very good building material, well adapted for local purposes. Where there is not too large a proportion of organic impurities, the sandstones of the coal measures may often be depended on, but there is apt to be a want of cementing ingredients binding the sand and gritty particles together.—D. T. A.]

SMITH, TILDEN, *Vine Hall, Hurst Green*—Proprietor.

Limestone, raised from a quarry on the property of Samuel John Nicoll, Esq., in the parish of Mountfield, Sussex.

Two blocks of concrete, formed with the Mountfield stone lime. One block has been kept in a damp place since 1850; the other has been kept dry. The Mountfield lime is especially adapted for submarine works, as it possesses the valuable property of hardening under water.

[The limestones of the middle part of the Wealden formation occur in the lower or Ashburnham group, and include a series of shelly limestones and shale resembling the Sussex marble. Extensive lime-works have been long carried on near Battle, and the rocks are found to be much disturbed with faults.—D. T. A.]

SOWDEN, MATTHEW, *Burley, near Leeds*—Producer.

Hard delf-stone grit, from a quarry at Burley, near Leeds, close-grained, strong, and durable; suitable for headstones, steps, &c., and generally for erections exposed to the weather.

TAYLOR, JOHN, *Stamford.*

Marble, sandstones, slate, limestone, &c., all obtained within six or seven miles of Stamford.

TOWNSEND, RICHARD, *Clearwell, near Monmouth.*

Forest stone for steps, coping, &c.

Ashlar blocks for paving, grave stones, wharf walls, and all kinds of buildings; from the Forest of Dean.

WALSH, JOHN, EXECUTORS OF, *Leeds*—Proprietors.

Sandstone, from the millstone grit series, used for docks, bridges, locks, engine beds, &c.

Potternewton stone, used for landings, sills, &c.

WILLIAMS, WILLIAM, 1 *Wellington Street, Cardiff, Wales*—Proprietor.

Freestone from the Quarrella quarry, near Bridgend, Glamorganshire. It contains 99 per cent. of silica. Specific gravity, 2·288.

LOCAL COMMITTEE, FALMOUTH and PENRYN.

Stone, from Porkellis, Wendron, suitable for building, roads, chimney-pieces, or tables. Stone from Forest-gate, Stithians; and from Church Town, about two miles distant; from Mylor, near Penryn; and from Wendron.

Granite, from Wendron.

Stone, for road-making, extensively used on the Truro, Penryn, and Redruth trusts, from Pasko and Treluswell quarries, Gluvias. Stone, from Steven's quarry, Higher Treluswell, Gluvias; and from Newham, Kea.

Specimen of porphyry, found near Swan Pool, Falmouth, containing crystals of rhomboidal quartz.

Quartz pebbles and sand, from Swan Pool beach.

Magnetic iron ore, from Treluswell, near Penryn.

[A large quantity of excellent road stuff is obtained in Cornwall from the "*elvans*," or porphyritic dykes, which traverse many parts of the county; these elvans also supply the chief building stones of the district. They are, however, not unfrequently met with in a decomposing state, and are then quite unfit for use. The stones obtained from Porkellis, near Wendron, sometimes nearly resemble sandstones. Many excellent stones, both granite and elvan, are obtained near Penryn. The decomposing porphyries and elvans yield occasionally a valuable fire-clay.—D. T. A.]

STIRLING, THOMAS, jun., *Belvedere Road, Lambeth*—Designer, Inventor, and Manufacturer.

Slate cabinet, illustrating the applicability of slate to the formation of strong-rooms, powder-magazines, larders, venison-houses, partitions to rooms, water-closets, &c. The covering of the cabinet is formed by the bottom of a slate cistern, consisting of slabs of slate secured together in panels by a method invented by the exhibitor. The same method is also applicable to the covering of the roofs of mansions with slate.

Slate is adapted for use in fitting up the floors and compartments of public baths and wash-houses: and for stables, being applicable to mangers, stall divisions, linings, floors, and drains. It is also adapted for balconies, larders, wine-cellars, dairies, and various other purposes.

Articles exhibited in the cabinet, &c., and in general use:—

Patent self-acting filter on stand. Filter, which can be supplied by hand or made self-acting. Small slate cistern. Pickling trough. Samples of slate roll ridge; common saddle-back slate ridge. Sunk channel in slate. Solid slate sink. Slate sink constructed of five pieces. Washing-basin for water-closet, &c. Ornamental loo-table top. Sofa and side-table ornamental tops. Chess, or ladies' work-table tops. Ink-stand. Water-closet supply box for slate cistern. Waste, union screw, and drawing-off tap for slate cistern. Samples of various nails and screws used in slate work. Half of roof covered with Delabole slab slates. Specimen of Bangor slab slating.

Specimens of roofs covered with imperial slates from the Bangor quarries; rag slates from the old Delabole quarry; rag slates and green rag slates from Llanberis quarry; red duchess slates with three green slate diamonds; slates from Festiniog quarries, as cut by Mathews' patent cutting machine; open space new quarry duchess slates from Llanberis quarry; imperial slates from Aberdovey quarries, near Machynlleth.

Slate bed-room and dining-room chimney-pieces, from old Delabole quarries—in imitation of marble.

Carved head-stone; cut clock face.

[The collection of slates referred to in the above description is calculated to give an idea of the best qualities introduced into the London market, with the kind of use to which most of them are applied. The chief localities are Cornwall (Delabole), Wales (Festiniog, Penrhyn, Llanberis, &c.), Lancashire, and Westmoreland. The Delabole is especially adapted for church and other roofs, and has been much used for this purpose.

The slates, lettered A, are from the great quarries at Penrhyn, and shipped at Bangor. These quarries have as many as 10 levels, and employ upwards of 2,000 persons. Those marked B, are from Llanberis; C, from the Dorothea Slate Company's quarri near Carnarvon; D, E, from quarries at Festiniog, shipped at Port Madoc; F, G, from near Machynlleth, North Wales, shipped at Aberdovey; H, from Delabole, Cornwall, shipped at Padstow; I, K, L, M, from near Ulverstone, in Lancashire, including some of the Westmoreland quarries, and shipped at Ulverstone.

The present consumption of slate in London is to the extent of from 30,000 to 40,000 tons per annum. One third of this quantity is in slabs, and the rest in roofing-slates, which are in nine sizes, called respectively "ladies," "countesses" (3 sizes), "duchesses" (2 sizes), "queens," "rags," and "imperials." From "ladies" (16 inches by 8) to "duchesses" (24 by 12), the slates are sold per thousand (of 1,200 slates), but above that size by the ton. The "ladies" weigh 25 cwts. the 1,200 slates, and the "duchesses" 3 tons. The regular-sized slabs vary from 1 to 6 feet in length, and 1 to 3 feet in breadth. A large quantity of slate slabs is now used for ornamental purposes.—D. T. A.]

ASHDOWN, WILLIAM, 28 *Queen Street, Dublin*—Producer.

Roofing and writing slates, slate pencils, and hones.

Roman cement.

DUTTON & CO., *Runcorn, Cheshire*—Manufacturers.

School slates, manufactured by machinery, framed in mahogany and bird's-eye maple. Book slates. Single slate.

AZULAY, BONDY, *Rotherhithe*—Producer.

Patent artificial fuel, made of coal dust by pressure, without the admixture of any other substance.

Coal-dust prepared for pressing.

Charcoal made of refuse tan, by extracting pyroligneous acid, tar, &c., from refuse matters.

[The immense compression obtained by the hydraulic press, has been employed in the arts for producing cohesion between loose particles of various substances. In the present instance, the same force is used to unite the separate particles of coal dust into a solid mass. A hard shining block of great density is the result of the pressure.—R. E.]

TURNER, SAMUEL, *Orchard Place, East India Docks*—Manufacturer.

Coal, and products of its distillation.

Products from caoutchouc and from wood.

[A number of highly remarkable and peculiar substances arise from the distillation of coal, caoutchouc, and wood. Coal yields, in addition to illuminative gaseous products, various volatile oils, tar, ammonia in several forms, and a complex number of singular chemical substances in a state of vapour, or fluid. Caoutchouc yields a volatile oil in which it is itself soluble, and is largely distilled for the sake of this product, which is used in caoutchouc solutions and varnishes. Wood yields an inflammable fluid called wood spirit, and an impure acetic acid, and tar.—R. E.]

COBBOLD, EDWARD, 1 *High Street, Kensington*—Inventor and Producer.

Peat, condensed without pressure.

[The method adopted by the present exhibitor to prepare peat for economic use as fuel is altogether different from that adopted generally. He mixes the peat with a large quantity of water, reducing it to an impalpable mud, and then, by getting rid of the water, obtains a compact mass of considerable density. The mechanical means adopted are simple, and take advantage of centrifugal force—the water being thrown off during rapid revolution.—D. T. A.]

COATES, GEORGE PETER & THOMAS, *Nitshill, near Glasgow*—Proprietors.

Block of coal, raised from the lowest stratum of the Victoria coal-pit, Renfrewshire; the seam six feet thick.

Alum ore, or schist which lies immediately above the coal, about two feet nine inches in thickness.

Limestone which lies immediately above the alum ore from the same coal-pit.

Alum ore in process of decomposition. Alum made from the ore.

Specimens of the principal iron-stone beds, fossils, and crystals found in this extensive mineral field. Diagram of the different metals and minerals found in sinking the Victoria coal-pit. Model of the underground workings, and representation of the shaft of the engine, and winding apparatus of the same coal-pit.

[The Victoria colliery is, probably, the deepest in Scotland, being 173 fathoms. It is sunk in the great coal region of South Scotland; a very irregular area, intersected in many places by rocks older than the carboniferous, but probably including in all more than a million of acres of productive coal. In the part known as the Renfrewshire coal field, there are ten seams of coal separated by thin bands of clay, the coal being covered by a thin bed of alum slate, and mixed with iron pyrites. A large quantity of alum is manufactured from this material, but the process requires from twelve to twenty years for its completion. Many ironstone bands, and some limestones occur near the coal, as many as sixty-six being known at Nitshill, the workable thickness reaching twenty feet of ore.—D. T. A.]

THE BIDEFORD ANTHRACITE MINING COMPANY. MAXWELL, JOHN GOODMAN, Chairman, *Bideford, Devon.*

Anthracite coal, used for drying malt, lime-burning, &c.

Compressed fuel, moulded in blocks.

Mineral black paint, in powder, and mixed with oil or coal tar: mixed with the latter article, it is said to form a cheap, durable, and preservative varnish; applicable to shipping, out-buildings, &c.

[The Bideford anthracite occurs in certain rocks of the carboniferous system, occupying a considerable portion of the county of Devon, and generally called the culmiferous series. The beds have been worked for upwards of a century, producing a moderate quantity of coal, but the workings are not likely to be greatly extended. The thickness is very variable, averaging as much as seven feet, but sometimes diminishing to a few inches, and sometimes being 12 or 14 feet. To the depth of 8 or 10 fathoms it has been generally removed by old miners by means of adit levels, but shafts have been sunk more recently.

The pigment referred to is a variety of the anthracite, probably formed by decomposed parts of it, and has been much used.—D. T. A.]

CORY, WILLIAM, & WILLIAM, jun., *Commercial Road*—Manufacturers.

London-burnt coke, for locomotive and foundry purposes.

[Coke is the fixed residium obtained by burning coal in enclosed furnaces, and is generally obtained by the complete combustion of the volatile part of the coal, though large quantities are also produced by the economical distillation of coal in the manufacture of common gas. Coking on a large scale is performed in sets of ovens or furnaces of peculiar form, each charged eve [illegible] with from 2 to 4 tons of fresh coal. The [illegible] furnaces being heated (generally by the he [illegible] previous coking), the coal is lighted from the top by a wisp of straw, all the doors and vents being open, and when in a state of combustion, the draught is so continued as to produce a gradual and slow combustion of the whole mass from above downwards, the gases being consumed. The calcination lasts about 40 hours, and the coal loses 20 to 25 per cent. of weight, but gains in about the same proportion in bulk. The texture of coke is peculiar, and determines its value.]

Dickinson, J., F.G.S., *Inspector of Coal Mines, Birmingham*—Producer.

Section of the strata in the coal and ironstone mines at Dowlais and Merthyr Tidvil, South Wales.

Shield, Joseph, *Newcastle-upon-Tyne*—Maker.

Model, showing the process of manufacturing shot from lead.

[Shot are made by melting lead, with which, usually, some arsenic is combined, at the top of a high tower. The melted metal passes through a cullender, and falling through a large column of air, at length falls into a water butt on the ground. The heights of these towers vary from 200 to 300 feet. In the progress through the air, the sphericity of the shot is obtained, and after being cooled in the water, they are selected, mixed with a little plumbago, and put into a small octagonal cask, which is made to revolve by mechanical power—in this way all roughness is removed, and the shot are polished.—R. H.]

Longmaid, William, *London*—Manufacturer.

Rock salt, chloride of sodium, from Cheshire. Ore, cupreous pyrites, containing sulphur, copper, silver, oxide of tin, iron, silica, &c., from Cornwall. Salt and ore, mixed and ground. Sulphate ash, the calcined product of the former, containing sulphate of soda, chlorides of silver and copper in a soluble state, and oxides of tin and iron, silica, and other insoluble matters. Bleaching powder, hypo-chlorite of lime, the chlorine of which is obtained by passing a current of dried air through a close furnace (heated externally) in which the ore and salt are in process of calcination. Silver and copper precipitate, and their produce. Glauber's salts, crystallized sulphate of soda. Salt cake, anhydrous sulphate of soda. Black ash, containing caustic and carbonated soda, sulphide of calcium, and coal. Crude alkali, the lixiviated product of crocus. Purified alkali, or carbonate of soda, obtained from the former. Crystallized carbonate of soda. Bi-carbonate of soda. Insoluble portion of sulphate ash. Crocus, oxide of iron, separated from the former by elutriation, iron the produce. Tin ore, bin-oxide of tin, obtained from the residual matters of the insoluble portion of sulphate ash, by further elutriation, as practised at the mines of Cornwall and Devon, in heating tin ores, tin the produce. Roman, or blue vitrol, sulphate of copper, obtained from copper precipitate, by oxidising the precipitate and treating it with sulphuric acid. Carburetted oxide of iron. Black ash waste. Black and brown iron paint. Limestone, carbonate of lime.

[The following is a simple explanation of the essential details of this process:—

Copper pyrites (the double *sulphuret of copper and iron*) is combined with salt (*chloride of sodium*), and roasted at a certain moderate temperature. By this, a double decomposition is effected. Sulphate of soda is produced by the combination of the sulphur of the ore with oxygen, to form, first, sulphuric acid, which then unites with the soda of the chloride of sodium. The copper is also converted into a soluble sulphate, the iron being left in a state of per-oxidation, the chlorine liberated, which is employed in the manufacture of bleaching powder.—R. H.]

Le Mesurier, Frederick, 34 *Great Winchester Street*—Part Proprietor.

Copper manufactured by patent processes, at Low's Patent Copper Company's Works, Penclawdd, near Swansea, exhibiting specimens of each product, from the raw copper ore to fine copper, with the slags from each.

Livingstone, Alexander Speid, *Swansea*—Inventor and Patentee.

Block of fuel made from small coal.

Bagot, Chas., 12 *Charlemont Place, Ireland.*

Specimen of turf, or peat. The products of turf are tar and a watery liquor; the former divisible into paraffine, heavy oil and light oil; the latter containing ammonia, carbonic acid, acetic and pyroligneous acid, and pyroxylic. The gaseous products are, carbonic acid, oxygen, hydrogen, and nitrogen. 100 tons of peat are said to give 10,000 gallons of liquor, 1,000 gallons of tar, 6,269 feet of inflammable gas. The 1,000 gallons of liquor afford one ton of sulphate of ammonia, sufficient acetic acid to give 13 cwts. of grey acetate of lime, and 52 gallons of pyroxylic spirit. The tar yields 300 tons of paraffine, 200 gallons of light hydro-carbonaceous oil, and 100 gallons of more dense and heavy oil.

Anthracite, or stone coal, from the coal-fields of Kilkenny, county Tipperary, on the estate of Ambrose Going, Esq., of Ballyphillip.

[The Kilkenny coal district includes a series of basins, or troughs, separated into three or four parts by carboniferous limestone. The strata are sandstones and shales, with fire-clay and several workable beds of anthracitic coal. The portion in the county of Tipperary extends for about 20 miles in length by 6 in breadth in the widest part. The beds are inclined at a high angle and undulate, the coal being worked by shafts to the centre or deepest part of the trough, and then upwards on both sides. There are only three beds in this district; two of them 2 feet each, and the other 9 inches. It is estimated by Sir R. Kane that 50,000 tons per annum are raised. The coal is considered to be of fair quality. It yields from 3 to 8 or 10 per cent. of red ash, and contains 9 or 10 per cent. of volatile matter.—D. T. A.]

Powell, Thomas, *Cardiff, Wales*—Proprietor.

Duffryn steam-coal.

Monkland Iron and Steel Company (Wm. Murray, 33 *West George Street, Glasgow*)—Producers.

Specimens of the seams of coal, ironstone, limestone, freestone, fire-clay, and Roman cement, contained in the various strata of the mineral field of Lanarkshire.

Specimens showing the relative quantities of coal, raw and roasted ironstone, pig iron, refined iron, and puddled iron, required to produce malleable iron.

Specimens of white pig iron and malleable iron, square, round, flat and half round; rails, wheel-tires, angle iron, and nail-rods.

[The coal-field of Lanarkshire comprehends about 150 square miles in that county, and contains from 20 to 30 seams of coal, of which five or six are generally worked in one colliery, having an aggregate thickness of about 20 feet. None of the coals are caking, and one kind (the columnar glance coal) burns without flame or smoke.

About half the coal raised is used in the iron-works. The total consumption in 1845 was upwards of two millions of tons.—D. T. A.]

Powell, Thomas, *Gaer, near Newport, Monmouthshire*—Proprietor.

Specimen of Duffryn steam coal, raised at Aberdare in Glamorganshire, and exported at Cardiff; stated to be well adapted for steam marine purposes.

Specimen of bituminous coal from the Monythusloyne vein, raised at Lispentwyn, Monmouthshire; adapted for household and smithy purposes.

Model of the apparatus used for the shipment of coals from boats or waggons at Cardiff dock, worked by a high-pressure steam-engine, and enabling vessels to ship 400 tons per day.

[The great coal-field of South Wales, presenting nearly 1,000 square miles of productive coal area, and divided into an anthracitic and bituminous portion, yields also, and abundantly, that intermediate semi-bituminous variety, called steam-coal, of which the above and some others are well known, and adapted for general use in the steam navy. The Duffryn steam coal is rather soft, free-burning, burns cleanly, without smoke, does not cake, and leaves a little white ash. Its specific gravity is 1·326. It yields 84·3 per cent. of coke, and contains—carbon, 88·26; hydrogen, 4·66; nitrogen, 1·45; oxygen, 0·60; sulphur, 1·77; ash, 3·26. Its relative calorific value (carbon being unity) is 87·7.—D. T. A.]

LATCH, JOSEPH, & Co., *Newport, Monmouthshire*—Producer.

Specimen of black-band iron ore, raised from the mines at Gilvach, parish of Gellygaer, Glamorganshire. It lies in beds or bands 3 feet thick, and 25 yards above the upper vein of coal. Analysis:—Protoxide of iron, 43·09; carbonic acid, 28·01; silica, 9·44; carbon, 12·29; alumina, 5·37; sulphuret of iron, 1·20; moisture, ·60.

BIRD, WILLIAM, & Co., 5 *Martin's Lane, Cannon Street, City*—Proprietors.

Specimens of Staffordshire bar, hoop, sash-frame, and plate iron; Welsh ordinary iron rails, and rail sections; Scotch bar-iron, spikes, and rivets; Tyre iron; patent lap-welded boiler and other tubes, plain and enamelled; patent corrugated coloured enamelled roofing plates. Specimens of cold-blast pig-iron; "Crane's" anthracite, "Budd's" anthracite, and Scotch pig-iron; cold-blast and anthracite refined metal, tin-plate iron, and tin plates.

MORGAN, RICHARD, & SONS, *Llanelly, Wales*—Producers.

Stone-coal, or anthracite, from Cwm Amman, Llanelly, Gelly Ceidrim.

ELLIOT, ROBERT, *Pensher Fence Houses.*

Iron and coal.

BUTTERLEY COMPANY, *Alfreton*—Producers.

Specimens of coal and ironstone, and of organic remains in connexion with the Derbyshire coal-field, including analyses of the different coal strata.

Iron in its different stages of manufacture, including pig-iron, refined metal, puddled, and merchant bar-iron.

Oscillating steam-engine, of 10-horse power, without a slide valve, the steam being admitted and exhausted through the trunnions by the motion of the cylinder.

[The great central coal-field of England extends into Derbyshire, and the works at Alfreton and its vicinity have been long known as exhibiting in all no less than 30 seams of coal, whose aggregate thickness is 78 feet.

The iron ore associated with the coal in this district is of excellent quality, and very abundant.—D. T. A.]

ATKINSON, JOHN, *Coleford, Gloucester.*

A complete set of specimens of the workable seams of coal and veins of iron ore, from the Forest of Dean, placed in compartments, showing the name and thickness of each, and also the name of the works from which they are produced; with two sections of the mineral basin, illustrative of the same. The case which contains the minerals is a specimen of the oak of Dean Forest.

[The Forest of Dean coal-field is understood to occupy about 45 square miles; the total thickness of the deposits being about 3,000 feet, of which there is a thickness of 52 feet of coal distributed in 28 seams. It is remarkable for the great regularity of the deposits over a large part of the area, the beds dipping steadily towards the middle of the basin, and the millstone-grit rising and surrounding it. There is, however, an extensive and remarkable fault crossing the field. The workable seams of the district are in three groups, the lowest of which have not yet been much worked, except near their outcrop, where they are reached by levels driven from the hill side. Some parts of the thicker seams measure as much as 12 feet.—D. T. A.]

BEECROFT, BUTLER, & Co., *Leeds*—Manufacturers.

Pieces of best double-fagotted railway axles, in the forged state, cut to show the mode of manufacture; and broken, to show the fibre in fracture.

Pieces of best quality of railway tire-bar, in the forged state, cut to show the mode of manufacture; and broken, to show the fibre in fracture.

Railway tires, and double-fagotted railway axles, best quality, and double-fagotted cart and carriage axles, in forged state, bent cold in different forms, to exhibit the toughness, soundness, and strength of the material.

[As the speed of the locomotive steam-engine became developed, many results presented themselves which were as unlooked for by the mechanic and engineer as the speed itself had been wholly unexpected. Among these none has been the cause of more anxiety, and none perhaps of more real danger, than the change which wrought iron in axles and in the tires of wheels is found to undergo when exposed to the severe friction induced by rapid speed under heavy loads. Metal that had been deemed tough and fibrous became brittle, and broke like cast iron.

The specimens of railway tires and axles exhibited, in various conditions, and showing the structure of the metal in fracture, illustrate this result.—W. H.]

Double-worked cable-chain iron, bent cold.

Tension bar-end, of best Kirkstall iron, torn asunder by 135 tons, by means of hydraulic pressure.

Bar of iron in the rolled state.

Walking-sticks made from the iron.

Railway-carriage wheels of different materials and various construction.

Waggon and mail axles on various principles.

Improved Collinge's India and other axles.

Registered self-acting regulating damper for high-pressure boilers.

Registered improved moveable eccentric tumbler.

FIELD, COOPERS, & FAULDS, *Worsbro' Dale, Barnsley*—Proprietors.

Silkstone Main house coal, from the Silkstone bed—thickness of bed 5 feet 6 inches.

Worsbro' Park hard or steam coal, and soft or house coal, from the Barnsley 10 feet bed.

[The Barnsley coal is obtained from part of the great central coal-field of South Yorkshire, Nottingham, and Derbyshire, a district extending from Leeds to Nottingham, and including as much as 650,000 acres of coal-field. The qualities of coal obtained are bituminous or household coal, steam coal, cannel, and anthracite, varying much in quality in different localities. There are about 12 workable seams, the total average thickness being upwards of 30 feet, and the thickest seam is 10 feet. The total thickness of the upper carboni [illegible] here is estimated at about 550 yards. [illegible] is worked on the long-wall method, a [illegible] —D. T. A.]

Patent Fuel Company, 15 *St. Mary Axe*—Manufacturers.

Specimens of Warlich's patent fuel, consisting of the following series:—Welsh steam fuel, manufactured at Swansea; North country fuel, manufactured at Middlesborough-on-Tees; household fuel, manufactured at Deptford, from North country coal; and locomotive coke fuel, manufactured at Swansea; with samples of the tar and coal used in the manufacture.

[Warlich's patent fuel consists of bricks measuring 9 inches by 6½ and 5, and weighing about 12 lbs. They are dense and well made, require breaking before use, and when burning, give off little smoke, but they take some time to light. They contain carbon 90·02, hydrogen 5·56, sulphur 1·62, ash 2·91. They are made of the dust of various kinds of coal; the above analysis having reference to those manufactured of Welsh coal.—D. T. A.]

Drew, Joseph, *St. Austell.*

Iron ore, magnetic and oxidulated, from the Trerank mine, near St. Austell. Brown hæmatite, from the same mine. Iron ores. Red hæmatite, from Treverbyn mine.

Day & Twibell, *Barnsley*—Proprietors.

A column of coal, three feet square at the base, showing the entire thickness, and all the different qualities of the seams or beds which are found together, and generally known by the name of the Barnsley thick coal, from the Mount Osborne Collieries, Barnsley, Yorkshire. About two-thirds of the entire bed or stratum produces house-fire coal, and one-third, coal for steaming, iron-smelting, &c.

Ulverston Mining Company, *Ulverston.*

Specimens of iron ore.

Firth, Barber, & Co., *Oaks Colliery, Barnsley*—Producers.

Coal for steam ships, for converting iron into steel, and for smelting iron.

Coal for domestic fires, from the Oaks Colliery, Barnsley, Yorkshire.

Russell, John, *Risca, near Newport, Monmouthshire*—Proprietor.

Specimen of black vein coal, raised at Risca, and exported at Newport: the vein ranges from 9 to 16 feet in thickness, and is worked by pits at a depth of 144 yards.

Specimen of Risca rock vein coal: the vein ranges from 4 to 5 feet in thickness, and is worked by pits at a depth of 100 yards.

Specimen of new black vein coal, raised at Cwm Tilery, and shipped at Newport; the vein is about 5 feet in thickness, and is worked by pits at a depth of 130 yards: this coal is stated to be well adapted for steam vessels.

Argillaceous iron ores from the lower coal measures of the South Welsh basin, raised at Risca.

Fire-bricks manufactured at Risca.

Harrison, Ainslie, & Co., *Newland Furnace, Ulverston.*

Hæmatite iron ore, from Lindal Moor, in Furness, containing metallic iron, 66·47 per cent.; oxygen, 28·50 per cent.; silica, 3·43 per cent.; zinc, ·71; moisture and loss, ·89.

Charcoal pig-iron and furnace cinder, from Newland, Backbarrow, Duddon, and Lorn furnaces, said to be the only charcoal furnaces in Britain.

Derwent Iron Company, *Shotley Bridge, Newcastle*—Manufacturers.

A rolled malleable iron-beam plate, used in the construction of marine engines, 17 feet 1½ inch long, 4 feet 6 inches broad, and 1⅛ inch thick, weighing 1 ton 5 cwt.

A rolled malleable iron plate, used in the building of iron ships, 20 feet long, 3 feet 6 inches broad, 5-8ths of an inch thick.

A piece of rolled keel iron, used in building iron ships.

A railway bar, measuring 66 feet 9 inches in length, 88 lbs. to the yard, and weighing 17 cwt. 1 qr. 26 lbs.

A railway bar, 65 feet 9 inches long, 12 lbs. per yard.

Clarke, Robert Couldwell, The executors of, *Silkstone, near Barnsley*—Producer.

Coal, from the old Silkstone Colliery, near Barnsley, Yorkshire.

[The column of coal here exhibited is called Peacock or iridescent coal, from the peculiar tints of colour which it shows, and which appear to be generally the result of some action of water on the surface and between the natural faces. This tarnish, rare in most collieries, appears to be particularly abundant in that from which the above specimens are taken. It is not quite clear whether it arises from a very thin film of foreign matter deposited on its surface, or whether the mechanical condition of the surface itself (as in the case of mother-of-pearl) produces the appearance of iridescence.—D. T. A.]

Models of corf, and set of tools, as used by colliers at work in the mines, and in raising coal from the pits.

Montague, Arthur, *Lydney, Gloucestershire*—Proprietor.

Specimens of the iron ore procured from the mines of the Forest of Dean Iron Company, and smelted at their iron works at Parkend, Gloucestershire, with the pig-iron, refined metal, and furnace scoria produced from it, viz.:—

Argillaceous, calcareous, and silicious hematite iron-ore.

Best forge pig-iron.

Refined metal.

Blast furnace scoria.

Phillips, Smith, & Co., *Llanelly, Wales*—Manufacturers.

Series of specimens illustrative of the manufacture of tin plates.

[To prepare tin plates, sheets of iron are carefully cleaned from all oxidation and from every trace of organic matter: then being dipped into a saline solution, which serves as a flux, they are dipped into melted tin, which is diffused by heat over the surface, and the tin plate is completed.]

Pig-iron, as received from the blast furnace.

Rough bar made from pig-iron, first melted and refined by blast and coke fuel, and converted into malleable iron in a charcoal fire, stamped and rolled into a rough bar.

Bar-iron made from the rough bar heated with blast and coke in a hollow fire, hammered and rolled into a finished bar.

Sheet-iron, known as black plate, rolled in case-hardened rolls from the bar-iron.

Black plate cleaned in a preparation of sulphuric acid passed through planished rolls, and softened by heating in pots previous to being coated with tin.

Sheet of black plate, partly tinned.

Wooden boxes, each containing a specimen of finished sheets of different sizes and thickness.

Stainton Mining Company, *Ulverston.*

Furness iron ore (hematite) produced from mines belonging to the Earl of Burlington, and used in Staffordshire, Yorkshire, and South Wales, for mixing with inferior iron ores.

Mitchell, William, *Wellington Street, Portobello, near Edinburgh*—Inventor.

Specimen of coal, and snuff-box made from it. Hone made from coal.

Horn of a bull, with iron frame and stuffed buffer attached. Somniferous electric brush.

Clay, William, *Liverpool*—Inventor and Manufacturer.

Bars of patent rolled taper-iron, used for ships' knees, mills-shafting, anchor-shanks, anchor-stocks, and other purposes. This iron is made by the rolling process, which is new. The quality is stated to be superior, owing to the elongation of the fibre.

The Ebbw Vale Co., *near Abergavenny, and* 83 *Upper Thames Street*—Producers.

Samples of coal and iron stone, with foils, from the Ebbw Vale iron works, in Wales, and the Coalbrook Dale iron works, in Shropshire.

Maps showing the strata, vertically, of the South Wales and Shropshire mineral fields. Model of the mineral workings taken both vertically and horizontally, of the Ebbw Vale estate. Working model of blast furnaces, showing the mode of using the gases and economizing fuel. Pieces of various pattern rails, bar-iron, angle-iron, &c. Samples of rails, full length, and other descriptions.

[The South Welsh coal-field has been elsewhere described. The Coalbrook-dale field contains 32 square miles of workable coal, the average number of seams being 17, and the average thickness of the principal seams three feet. The field is much faulted, some of the dislocations amounting to 600 or 700 feet. The coal is of the kind called slate coal, and contains from 1 to 3 per cent. ash. The percentage of carbon is 56 to 64. Very excellent iron is made from several seams of clay iron ore interstratified with the coal, and yielding upwards of three tons of ore per square yard.

The Ebbw Vale coal is brilliant, brittle, lights easily, and yields a clear fire. It is light, weighing 53¾ lbs. to the cube foot.

It contains 89·78 carbon ; 5·15 hydrogen ; 2·16 nitrogen ; 1·02 sulphur ; 0·39 oxygen, and 1·50 ash. The coal yielding the above analysis is that known as the "Ebbw Vale 4 feet steam coal." The mine is 400 to 500 feet deep.—D. T. A.]

Coal Trade of Northumberland and Durham, *Newcastle-upon-Tyne.*

Map of the coal-field of Durham and Northumberland, showing the pits and railways, with the faults and other remarkable interruptions.

Section of the coal-field, from and to given points, north and south; and a similar section from east to west.

Synopsis of the coal seams, in explanation of the map and section.

Working plan of a colliery, exhibiting the system of working and ventilating the coal mines.

Specimens of the fossil plants of the coal formation, all figured in Lindley and Hutton's Fossil Flora.

1. Lepidodendron Sternbergii.
2. Ulodendron majus.
3. Ulodendron minus.
4. Lepidodendron gracile.
5. Lepidodendron selaginoides.
6. Sphenophyllum erosum.
7. Calamites nodosus.
8. Bechera grandis.
9. Asterophyllites foliosa.
10. Pecopteris adiantoides.
11. Pecopteris heterophylla
12. Sphenopteris crenata.
13. Sphenopteris crithmifolia.
14. Neuropteris gigantea.
15. Sigillaria pachyderma.
16. Sigillaria catenata.
17. Sigillaria oculata.
18. Sigillaria reniformis.
19. Bothrodendron punctatum.
20. Pecopteris nervosa.
21. Asterophyllites comosa.
22. Lepidodendron elegans
23. Pecopteris laciniata.
24. Asterophyllites jubata
25. Sphenopteris latifolia.
26. Sphenopteris fucata.
27. Neuropteris heterophylla.
28. Lepidostrobus pinaster.
29. Sphenopteris Hœninghausi.
30. Sigillaria flexuosa.
31. Lepidodendron plumarium.
32. Asterophyllites rigida.
33. Sphenopteris cuneolata.
34. Pecopteris Bucklandii.
35. Sphenopteris linearis.
36. Stigmaria ficoides.

Various specimens of household, coking, manufacturing, and cannel coal.

Specimens of coal from the carboniferous limestone formation of Northumberland.

Specimens of the strata and rocks of the coal formation.

Specimens of the strata and rocks of the carboniferous limestone formation.

Specimens of coke.

Safety lamps, used in the Durham and Northumberland collieries.

Drawings representing sections of Walbottle Colliery engine pit, in which the engines, pumps, &c., are shown.

Model, showing the method of drawing coals from the mine, and screening the same at the surface.

Model in wood, showing the mode of ventilating coal mines.

Model, showing an underground ventilating furnace.

[The Newcastle coal field is estimated to contain upwards of 360,000 acres of productive coal area in the county of Durham, and nearly 150,000 in Northumberland. Of this 67,000 acres are now worked, and the average thickness of coal may be regarded as 12 feet. An acre contains 4,840 square yards, and each cubic yard of coal is estimated to weigh a ton; so that it may be considered that the coal field has contained more than 10,000 millions of tons of coal, of which about one-eighth part is probably consumed, and the present annual consumption may be estimated at ten millions of tons, including the quantity destroyed and rendered unserviceable.

The maps and sections exhibited illustrate the condition of the district and the details of the coal field. The qualities of coal are three: the common caking kinds, coarser kinds called splint coal, and cannel coal. They are all bituminous, but the proportions differ. The average quantity of gas from the caking coals is about 8,000 cubic feet per ton, the weight of coke being from10 to 12 cwt.

The cannel coal has been much and profitably worked within the last few years, and yields a very much larger quantity of gas, amounting to 10,000 or 12,000 cubic feet the ton.

The coal is worked in the Newcastle coal field at a very great depth, exceeding in some cases 1,800 feet, and the areas worked from one set of pits are often very large, amounting to 500 or even 1,000 acres. The associated beds of the coal measures are grits and shales, and there are many slips and faults, some of them very considerable.

The method of extracting the coal in the Newcastle coal field is that called *pillar and stall*, which consists in first working a certain proportion of the coal by opening galleries at right angles to each other, leaving large pillars of coal to support the roof. These pillars are afterwards removed, and the roof allowed to sink down, forming what is technically called the *goaf*.

Owing to the large proportion of gas present in the coal, and the fact that such gas is given off readily from a newly-fractured surface, and on mixture with atmospheric air becomes highly explosive, it is necessary to take great care of the ventilation of the mines, and this more especially when the roof is partly fallen. The method of working has therefore reference to this, and the lights employed where any danger is supposed to exist must also be adapted to the peculiar condition of the mine. The models showing the mode of ventilation and the structure of the ventilating furnace used to produce a strong current of air to circulate through the mine, together with the safety lamps (invented by the late Sir Humphry Davy) will illustrate these methods. The mechanical contrivances for drawing and screening the coals (separating the dust and small coal) are also very important in the economy of the district.

There are nearly 200 pits or collieries worked in the district; the number of men and boys employed is about 26,000; and the average price of the coal as shipped for London is not more than 11*s*. per ton. The estimated quantity of coal, sold in the year 1847, was about 7,730,000 tons.—D. T. A.]

RICHARDS, ALFRED, *Redruth, Cornwall*—Designer.

Sectional model of East Pool Mine copper lode, Cornwall; showing its direction by an east and west line marked at the base of the model, and the underlies by a perpendicular shaft. The excavations show where the lode has been developed, and whether it has been worked profitably; the levels, winzes, pitches, &c., are labelled.

This method of modelling is considered to have an advantage over sections drawn on paper, as it shows the direction and underlies of the lodes.

BLEE, ROBERT, *Redruth*—Inventor.

Safety bucket to be used in mines for drawing up persons or produce. This bucket is furnished with guides to run in grooves which extend along the whole depth or shaft of the pit. To the guides are fixed strong crooks to which the drawing-rope is attached. So long as the tension of the rope continues, the crooks are held in over the bucket. Should the rope break, and its tension consequently cease, the crooks are immediately thrown out by springs, which constantly act on them, and cause the crooks to take hold on the iron staves of strong ladders fixed at the back of the grooves throughout their length.

TAYLOR, R., *Falmouth*—Proprietor.

Model of the machinery and apparatus used for dressing the inferior copper ores called halvans, at the Tywarnhaile mines, the property of His Royal Highness the Prince of Wales, in the Duchy of Cornwall, consisting of—

Crushing mill, which pulverizes the ore more effectually than the common stamping mills.

Reservoir for receiving the pulverized mineral, and passing it, by the action of a stream of water, to the shaking trunk.

Self-acting shaking-trunk, in which the mineral is separated into proper sizes, for the subsequent processes, by means of a revolving cylindrical sieve, instead of the ordinary process of shaking or stirring it with shovels in a stream of water.

A tye, for cleaning the rough grain ore which does not pass through the cylindrical sieve, and preparing for sale part of the ore which settles at the head.

Double lever jigging machine, for dressing the poorer portion of the mineral from the tye, technically called the tails: by a single operation of this machine, the earthy matter is separated from the ore, and rendered fit for sale. With some qualities of halvans, the use of the tye is dispensed with, and the rough grain comes direct from the shaking sieve to the jigging-machine.

Round buddle, for dressing the fine-grained mineral, which passes through the sieve and settles in the shaking-trunk; the ore which it contains is rendered fit for sale by being twice buddled.

Slime pit, for receiving those portions of the mineral which are reduced to so fine a powder as to be carried away, in the shaking and other processes, by the stream of water.

Self-acting trunks, for removing a large proportion of the earthy matter contained in the slimes; when thus concentrated, the slime ore is rendered fit for sale, by being twice buddled.

Specimens of the mineral in its several states of preparation, and of the clean ore, accompany the model.

LANDALE, DAVID, 6 *Forth Street, Edinburgh*—Proprietor and Designer.

Vertical sections of the Scotch coal-field, exhibiting in series all the known seams of coal-beds, of ironstones, and of limestones, with the intervening strata, from the upper red sandstone down to the main bed of the carboniferous limestone.

Specimens of Ayrshire and Fifeshire coal and iron stones.

JENKINS, WILLIAM HARRY, *Truro.*

Specimens of arsenic:—White arsenic, arsenious acid, used in glass manufactories, in patent shot manufactories, for washes for sheep, to preserve the wool and prevent the fly, and for preventing smut in wheat, &c.; white arsenic, in crystals, and sublimated, for the same purposes. Realgar, sulphuret of arsenic, used by painters as orange red pigment; orpiment, used by painters as yellow pigment.

BOLITHO, EDWARD, *Penzance.*

Model of a reverberatory tin smelting furnace and circular table, 51 inches in diameter. The table revolves on rollers. The model stands in the centre of the table, and is surrounded by specimens of various ores prepared for smelting, as well as products from the smelting works.

[Near this will be found a model of the dressing floors, in one of the mines of the Duchy of Cornwall, in which will be found illustrations of the mode of washing, &c. The tin ores containing arsenic and sulphur are submitted to a roasting process to expel these, and such as contain wolfram are treated by some chemical method, such as that devised by Mr. Oxland, and elsewhere described. The tin ores are then submitted to the smelting process, as shown in this model, a portion of carbon being employed to prevent the oxidation of the metal.—R. H.]

JOHNSON, WILLIAM, *Kenlough House, Ballyshannon, Ireland.*

Draining tiles, from Kenlough.

Specimens of coals, from Kenlough Colliery, Ballyshannon.

JENKINS, W. H., *Truro.*

Varieties of mundics, or pyrites, from various mines in Cornwall—Mangan Mine, an arsenuriet of iron. Wheal Withey, near Truro; Baldher Mine, near Truro; Royal Polberrow Consols Mine in St. Agnes; Wheel Andrew and Nangiles, near Truro, and others, a sulphuret of iron. Assorted specimens of pyrites of various qualities, from different mines, by the use of which, in combinations, a large produce of sulphuric acid is obtained.

[The arsenical pyrites, and the copper and iron ores containing arsenic, are the common sources for this substance. The ores are first roasted in "burning houses," and the volatile matters, sulphur and arsenic, collected in the flues. These are afterwards separated from each other by a more delicate process, so as to sublime one and not the other.

Wolfram, tungstate of iron, has only lately been introduced into the market. The tungstate of soda and tungstic acid are proposed to be employed as a mordant, and a new crimson pigment is an oxide of tungsten.—R. H.]

CADELL, HENRY, *Scotland.*

Coal from Dalkeith Colliery, as a specimen of the general coal-field of Midlothian, with section showing the strata in the coal-field at a depth of 523 fathoms.

Steelyard, with improvements.

[The Midlothian coal-field is not very distinctly bounded, but contains some kinds much esteemed for household use. It is estimated that the district contains in all, 24 distinct seams, having a total thickness of 94 feet of coal.—D. T. A.]

BANKART, FREDERICK, & SONS, *Redjacket Copper Works, near Neath, Wales*—Inventors and Manufacturers.

Various stages of the process of copper smelting, as practised at Redjacket Works, according to the exhibitors' patent process.

[This process is as follows:—Copper pyrites reduced to a fine state of division are roasted at a moderate temperature: the result is, that the sulphur of the ore combines with the oxygen of the air, and thus becomes converted into sulphuric acid. The copper is also oxidized; and the acid combining with it, a sulphate of oxide of copper is produced. A second roasting, with an addition of rich sulphur ore, converts all the metal into this salt. It is now dissolved in water, and the copper precipitated by iron. It has been found that the copper thus prepared is of remarkable purity.—R. H.]

Rees' patent fuel, prepared from coal alone.

Pure native carbon, found in the collieries of Messrs. Penrose and Starbuck, Vale of Neath, and electrodes manufactured from it by the exhibitors.

Stained glass window, executed by the exhibitors, containing a number of small pieces of glass united upon plate-glass. By this means the use of the lead joinings hitherto employed is obviated, and effects not hitherto attainable in this description of work are produced.

ABERCARN AND GWYTHEN COLLIERIES COMPANY, *Newport, Monmouthshire*—Proprietors.

Block of Abercarn stone; a hard compact sandstone which resists the action of the weather and of fire, and is one of the hard and durable stones found in the sedimentary rocks; it forms a part of the carboniferous (or coal-bearing) series of strata in South Wales. The block is formed in the shape of an obelisk, for the purpose of exhibiting on each face different modes of workmanship in the dressing of the stone.

Block of Abercarn and Gwythen charcoal-vein coal, adapted for steam-vessels; exported at Newport.

Block of Abercarn rock-vein coal.

Complete set of the tools used in raising these materials.

[The Abercarn stone, worked in the coal-grit of Monmouthshire, has an argillo-silicious cement, and is rather micaceous. There are 25 feet of workable stone, and large blocks can be procured. It is very durable, and not expensive. It weighs about 168 lbs. to the cubic foot. —D. T. A.]

COPELAND, G. A., *Pendennis, Falmouth*—Inventor and Manufacturer.

Safety blasting cartridges, adapted for all kinds of blasting; intended to afford protection to the workmen from premature explosions, &c. The expedition in search of Sir John Franklin was furnished with them, by order of Her Majesty's Government, for ice-blasting in the arctic regions.

BUTLER, JOSEPH LAWRENCE, *Liverpool*—Proprietor.

Specimens of coal, cannel-coal, and coke, from different seams, worked by the Moss Hall Coal Company, at Ince, near Wigan.

VIEILLE MONTAGNE ZINC MINING COMPANY. H. F. SCHMOLL, General Agent, 12, *Manchester Buildings, Westminster*—Producer.

Colossal statue of The Queen on her throne, in all the attributes of royalty, eighteen feet high, in imitation of bronze, sculptured by M. Dantin, sen., and cast in zinc by M. Paillard, Paris.

Busts of The Queen and H.R.H. Prince Albert, life size, in imitation of bronze, sculptured by Francis.

Statuette of Sir Robert Peel, two feet high, in imitation of bronze, sculptured by Noble.

Eos, favourite greyhound of H.R.H. Prince Albert, life size, in imitation of bronze, sculptured by Francis; all cast in zinc by Karl Schröder, of London.

Model of sections of Her Majesty's ship "Albion," two-decker, of 90 guns, bolted with zinc bolts and painted with zinc paint; by Philip Trant, working shipwright of the Royal Dockyard, Plymouth; zinc bolts and butts do not rust like iron bolts; they have great strength and durability, and are cheaper than copper bolts.

Model of a frigate of 50 guns, sheathed with zinc and painted with zinc paint; also by Trant.

Designs in perforated zinc by Charles Jack.

Sundry specimens of zinc manufacture.

[Castings in zinc are bronzed in two ways; one is simply the application of a kind of paint, and the other is by producing on the surface an actual coating of copper by electro-chemical action. The use of zinc bolts is of very recent introduction; they appear less liable than iron to corrosion, unless they form part of a galvanic current, when they are rapidly destroyed. Zinc castings bronzed are very durable, and can be produced at a moderate cost. —R. H.]

VIVIAN & SONS, *Swansea*—Manufacturers.

Raw copper ore; produce, 9·7. Sulphuret of copper and iron in combination.

Calcined ore; copper produce, 7·5.

Raw ore furnace metal; produce of the granulated specimen, 30·5; of the solid piece, 33·7—containing sulphuret of copper and iron in nearly equal quantities.

Calcined ore-furnace metal; copper produce, 34·6.

Pimpled metal; copper produce, 76·1.

Blistered copper; copper produce, 95·6.

Refined copper, two cakes, one broken across; and two ingots, one broken across.

Slag from ore and metal furnaces.

Series of regulus of copper and iron, showing the different character assumed by each different combination; commencing with equal proportions of copper, iron, and sulphur, and ending with pure sulphuret of copper.

Ore furnace metal; copper produce, 35·5.
Red metal; copper produce, 61·3.
Blue metal; copper produce, 66·9.
Sparkle metal; copper produce, 72·6.
White metal; copper produce, 73·2.
Pimpled metal; copper produce, 76·1.
Selected metal; copper produce, 78·3.
Regull; copper produce, 77·8.

[The ore as obtained from the mine as represented in the first specimen, which is the ordinary copper pyrites, is subjected to a calcining process by which arsenic and sulphur are dissipated and part of the metallic sulphurets changed into oxides and sulphates. After the third process the metal still contains sulphur and iron, with other impurities; but by the fourth operation the larger portion of the sulphur and other volatile matters are driven off and replaced by a proportionate quantity of oxygen, thus forming oxides and sulphates, which seldom exceed 4 per cent. on the whole. The pimpled copper, after the fifth process, is almost a pure sulphuret of copper, with particles of pure metallic copper finely interspersed, the foreign matters being arsenic, iron, tin, and lead, which are only to be found as mere traces. Blistered copper is metallic copper still containing small traces of iron, tin, lead, and a little oxide of copper, after which, by the seventh process, the metal is rendered nearly chemically pure. The slags exhibited show the matter in which the various impurities are separated; these are of very variable composition, but have a peculiar interest to the mineralogist, as showing the mode of formation, under the operations of high temperatures, of many earthy minerals.—R. H.]

JOHNSON & MATTHEY, 79 *Hatton Garden*—Manufacturers.

Specimens of metals and metallic compounds:—Platinum crucibles, with capsule covers; and with ordina covers. Capsules, spatula, and large basin of this metal; oxide and sponge platinum.

Palladium; part of an ingot; a cup, soldered with fine gold; another, smaller, raised with the hammer; alloy of silver and palladium used by dentists and philosophical instrument makers; oxide of palladium; and its salts, red and yellow.

Iridium; pure metallic in vase; and the native alloy, as used for nibs of pens; its oxide and salts.

Rhodium; metallic in vase; its crystal of sodo-chloride; oxide; and phosphuret.

Uranium; its oxide; glass vessel showing the colour produced by the oxide of uranium.

[Platinum was discovered by Ulloa in 1735, but it was first rendered available by Dr. Wollaston. The largest supply of the metals platinum, palladium, iridium, rhodium, and uranium, is obtained from the Uralian Mountains; some is procured from the alluvial deposits of Brazil and other parts of South America. These metals, except uranium, are commonly found combined. Uranium is procured from pitchblende, uranite, and other minerals found in Cornwall and Bohemia.—R. H.]

[The colour produced by mixing a minute portion of the oxide of uranium in a mass of molten glass is one of the most beautiful colours obtained by art. It is a charming golden green of an opalline lustre so peculiar as to distinguish it from all other colours in glass.—R. E.]

O'BYRNE, WILLIAM CHARLES, 7 *Montague Street, Portman Square*—Proprietor.

Specimen of Slievardagh coal.

[Slievardagh is in the county Tipperary, which contains a coal-field about 20 miles long, and 6 miles broad at the widest part; the coals lying in deep troughs, and consisting of three beds, one nine inches, and the others two feet deep. It is estimated by Sir R. Kane that 50,000 tons of coals per annum were worked from this district in 1845.—D. T. A.]

WATNEY, ALFRED, *Llanelly, Wales*—Producer and Manufacturer.

Specimen of pure anthracite coal, raised from a pit at Gwendraeth, Llanelly, Carmarthenshire.

Two models of anthracite blast furnace (scale half-inch to one foot), situated at Gwendraeth, Llanelly, Carmarthenshire.

Pig-iron of excellent quality for foundry, tin-plate and boiler-plate purposes.

Furnace cinder or slag, classified according to the quality of iron made simultaneously with each.

Raw coal used in furnace; it burns without smoke, and bears the strongest heat without decrepitation.

Raw and calcined clay ironstone.

Limestone used as flux.

Sandstone used for lining hearths and boshes of furnace.

ABERDARE IRON COMPANY, *Aberdare, near Merthyr Tydvil, Wales*—Proprietors.

Aberdare steam-coal.

[The steam-coal of South Wales is compact, very slightly bituminous, burning almost wholly without smoke, and not subject to spontaneous combustion. It contains generally from 80 to 85 per cent. carbon, and less than 3 per cent. of ashes, and may be regarded as intermediate in quality between bituminous coal and anthracite. It is found abundantly, and is chiefly shipped at Swansea, and at a very moderate price.—D. T. A.]

RUSSELL, JAMES, & SON, *Bathgate, Stirling.*

Specimen of cannel or gas coal, from Boghead, near Bathgate, Scotland, chiefly used for the production of gas, of which it yields 13,500 cubic feet per ton; the specific gravity being ·775.

Chips of the above coal are found to be so inflammable that, being lighted at a taper, they burn like a piece of wood.

GARLAND, THOMAS, *Fairfield, Redruth*—Manufacturer.

Impure oxide of arsenic, obtained from tin ores (containing arsenical pyrites) by calcination.

Commercial oxide of arsenic, obtained from the foregoing by sublimation in reverberatory furnaces, and afterwards ground to an impalpable powder.

A finer quality of the preceding.

Lump arsenic, obtained from the preceding by sublimation in close retorts.

[Arsenic is found native occasionally, but is more frequently combined with other metals, of which iron, cobalt, nickel, silver, copper, antimony, and manganese are the chief. It is very soft but brittle, and volatilizes readily at a temperature of 365° Fahrenheit. It combines with oxygen in *white arsenic* (arsenious acid), and with sulphur in *realgar* and *orpiment*. The former substance is used in medicine, in the manufacture of glass, &c. The sulphurets are valuable pigments, both in dyeing and in the fine arts.—D. T. A.]

PUCKEY, JOHN, *St. Blazey, St. Austell*—Agent.

Mass of copper ore, about 1,500 lbs. in weight, from Par Consols mine, St. Blazey, Cornwall. This specimen contains some quartz and chlorite, and shows the "walls" and inclination of the lode.

[The produce of this mine for some years has been as follows:—

	Ore in Tons.	Copper in Tons.	Copper in Cwts.	Total Value. £.
1845	5,655	464	10	30,881
1846	6,065	557	12	35,144
1847	6,101	625	10	42,953
1848	8,470	914	8	52,353
1849	12,228	736	9	47,249
1850	7,152	641	2	44,090

—R. H.]

PATTINSON, HUGH LEE, *Newcastle-upon-Tyne*—Inventor.

Specimens to illustrate the exhibitor's process for the separation of silver from lead: viz., original lead; crystallized lead; slabs of lead, to show the form of the crystals; rich lead; plate of silver obtained by submitting rich lead to cupellation. Large drawing to illustrate the process.

[This process of desilverizing lead is founded on the physical fact, that lead crystallizes at a temperature above that at which silver solidifies, and in this process of aggregation, the silver is separated from the commoner metal. It is effected by the use of hemispherical cast-iron pans, holding about three tons of metal, which are heated by a fire below them; the argentiferous lead is placed in these, and melted, after which the fire is withdrawn, and all made air-tight below. The workman now begins to agitate the mass, which he does with an iron rake, removing the solid parts from the edges, as solidification takes place. With an iron strainer the solid crystals are removed as fast as they are formed; these are nearly pure lead, the liquid mass left behind being rich in silver. This process is repeated three or four times, the mass left after the last operation, which contains from 3 to 400 ounces of silver to the ton, is then submitted to the process of cupellation, by which the lead is oxidized, and the silver left in a state of purity behind.

By the original method, lead ores containing less than 20 ounces of silver to the ton scarcely paid the expense of working. By this process, ores containing only three ounces to the ton, are made to yield their silver.—R. P.]

PATTINSON & CAIN, *Newcastle-upon-Tyne*—Producers.

Specimens of a peculiar ore of lead, viz., arsenio-phosphate of lead, rarely found in such large masses. From Dry Gill Mine, near Hesket New Market, Cumberland.

[This appears to be the mineral called by Breithaupt, Kampylit, an arseniate of lead, in which the arsenic is partially replaced by phosphorus.

The arsenio-phosphate of lead from this mine has been employed in glass manufacture, for the purpose of giving high transparency to the best flint or crystal, which appeared to be produced by the formation of a lead glass, which may be regarded as a phosphate of lead and silica. —R. H.]

ORMEROD, —, *Manchester*.

Copper pyrites. Cobalt ochre.

[Copper pyrites is an ore of copper containing about 36 per cent. of sulphur, 34 of copper, and 30 of iron.

Cobalt ochre (cobalt bloom) is a native hydrated associate of cobalt, consisting of water, protoxide of cobalt, and arsenic. These specimens are from Alderley Edge, Cheshire, where they occur under very peculiar geological conditions.—W. D. L. R.]

WIDDOWSON, JOSEPH, *St. Austell*—Manager.

Slab of rosin tin ore, from the 25 fathom level at West Par Consols mine, near St. Austell, Cornwall, containing 74 per cent. of ore. The ore as prepared for sale. Sample of the metal.

Stone of the magnetic oxide of iron, from Roche Rock iron mine, in the parish of Roche, Cornwall.

Sulphuret of copper, or yellow copper ore, from Bodmin Wheal Mary Consols, near Bodmin, Cornwall. Ore broken from a lode or vein. Sample of the same as prepared for sale.

SECCOMBE, SAMUEL, *Phœnix Mines, Liskeard*—Producer.

Specimens of tin and copper ore, and gozzar. Pieces of copal and of the stratum from the side of the lode.—All from one lode in Phœnix mines in the parish of Lenkinghorne, near Liskeard.

Fire-bricks.

Specimen of native copper from West Carradon mine.

Piece of barytes from Wheal Mary Ann.

LENTAIGNE, JOHN, *Tallaght House, Dublin*—Proprietor.

Specimens of iron pyrites, from the great sulphur lode, Ballygahan mine, Wicklow; exported to Liverpool, &c. Sulphuret of copper, from same place. Sulphuret of lead, or galena; white carbonate of lead; sulphate of barytes, with crystals of phosphate of lead; all from Glenmolure mine, county Wicklow.

Native gold, and imitation of a large piece (found some years ago), from the gold mines, county Wicklow. Silver (the property of Mr. Donegan, Dublin), from the Irish Mining Company's lead mines.

Specimens of stratified breccia, composed of angular fragments of granite embedded in calp or impure limestone, and of granite, from Crumlin quarry, near Tallaght, county Dublin. Limestone from Sutton, same county, and from Clane, county Kildare. Porphyry, from Lambay Island, county Dublin.

Sulphuret of lead, from Killing mine, county Dublin; from Clontarf mine; from Lyrus, county Kildare; and other counties. Black oxide and other copper ores from Ballystein, county Limerick. Sulphurets of lead and copper, in fluate of lime, from Inveran, near Galway. Peacock copper ore, from Killarney mines. Oxide of manganese, from Glandore, county Cork. Bog iron ore, from Howth, county Dublin. Crystals of quartz, weighing 84 lbs., from Donegal.

[The iron pyrites of Wicklow is used in the chemical works of St. Helen's and other places near Liverpool, for various processes where sulphur is required. It contains, when pure, iron 46·67, sulphur 53·33.

This material is associated with the copper ores of Wicklow, and occurs in a vein traversing the copper lodes in a north-eastern and south-western direction. It is found at the surface, and is raised in large quantities, down to the depth of 50 feet, the lode varying in width from 4 to 36 feet.

The native gold of Wicklow is remarkable for the comparatively large quantities in which it has been found. Some of the lumps weighed from 18 to 22 ounces, and 945 ounces were collected during some operations carried on by Government some years ago. The gold is associated with iron and quartz, in a bed of detritus varying from 20 to 50 feet deep.

Considerable quantities of silver, as well as gold, have been found in Ireland at various periods in the history of the country.—D. T. A.]

DYER, WILLIAM BUNT, *Mold*—Proprietor.

Blue lead (galena) and sulphuret of lead ores from Jamaica mine. Produce 80 per cent. lead and four ounces silver per ton of lead. It is used by potters for the purpose of smoothing earthenware glaze.

BURR, THOMAS, WILLIAM, & GEORGE, *Shrewsbury*—Producers and Manufacturers.

Mineral specimen, raised at the Snailbeach lead mines, Shrewsbury, weighing 12 cwt., containing cubes of lead and zinc ore, in conjunction with carbonate and sulphate of barytes.

[The produce of the Snailbeach Mines since 1845 has been as follows:—

	Lead Ores. Tons.	Lead. Tons.
1845	3,000	2,000
1846	3,852	2,700
1847	3,486	2,440
1848	3,463	2,436
1849	3,196	2,301

The returns for 1850 are not yet completed.—R. H.]

Composition tube, being an amalgam of certain metals, calculated to resist the action of acids contained in water or gas.

GREY, JOHN, *Dilston, Corbridge*—Agent.

Blende and calamine from Alston Moor, Cumberland. Four plates of spelter, two whole, and two broken, produced from the same.

DAVIES and TAYLOR, *Aberystwyth*.

Lead ores.

[The Cardiganshire mines are among the most interesting in the kingdom. They were worked at a very early period, probably by the Romans. Henry VII. encouraged mining by several grants, involving privileges to those who would work these mines. In the reign of Queen Elizabeth, there was a grant made of all these mines to Thomas Thurland and Daniel Houghsetter, Germans, who worked these mines for some time. They eventually passed into the hands of Sir Hugh Middleton, who realized so large a profit by working them, that in 1608, he set about the great work of bringing the New River from Ware to London, for which he was knighted by James I.

The present value of the Cardiganshire mines will be seen by the following list of the produce of these mines in 1849.

MINES.	Lead Ore Returns.		Lead Returns.	
	Tons.	Cwts.	Tons.	Cwts.
Lisburne Mines	2,733	0	1,804	0
Cwm-y-stwyth	583	0	333	0
Esgair-hir	. .		. .	
Cwm-sebon	55	0	33	0
Llanfair Clydogau	206	0	134	0
Goginan	1,160	0	766	0
Gogerddan Mines	131	0	87	0
Nanty-y-creiau	. .		. .	
Pen-y-bont-pren	12	0	7	0
Cefn-cwm-brwyno	10	0	7	0
Bwlch Consols	635	0	425	0
Nanteos	177	0	106	0
Aberystwyth (small mines)	31	0	20	0
Llanymaron	. .		. .	
Llanbadarn	. .		. .	
Bron-berllan	. .		. .	
Brynarian	40	0	28	0
Cwm-erfin	116	0	78	0
Daren	29	0	20	0
Eisteddfodd	20	15	14	0
Llwyn Malys	32	0	21	0
Bwlch-cwm-erfin	18	0	12	0

R. H.

Byers, Joshua, *Stockton-on-Tees, Durham*—
Producer and Manufacturer.

Lead ore from Grasshill Mine, Teesdale.
Silver and litharge from the same mine.
Refined, common, and slag lead.
Thin sheet-lead and lead pipe.

Bird, John, *Wallwyd, Merioneth, Wales*—
Proprietor.

Specimen of silver lead ore, weighing 350 lbs., containing 16 cwt. 3 qrs. 10 lbs. of lead per ton, 82¾ oz. of silver per ton of lead, extracted from the great Cowarch silver lead mine, which has been in work seven years, and is situate on the Browddwy estate, the property of the exhibitor. Exported from Aberdovey, North Wales.

Bickford, Smith, & Davey, *Tuckingmill, Cornwall*
—Inventors and Manufacturers.

Several kinds of safety fuse, adapted to convey fire to the charge in the blasting of rocks or of ice, or in submarine operations. The fuse consists of a small column of gunpowder, spun into the centre of a cord. The different kinds are made by adapting the coating to resist the pressure of water. Gunpowder not being allowed in the Exhibition, these samples are made with sand.

[The safety fuse is considered to possess three great advantages over the ordinary mode of firing a charge: first, that of certainty both as to time and resistance to damp; second, that of safety; and thirdly, that of economy.—D. T. A.]

Maguire, Thomas, Secretary to the General Mining Company for Ireland, 2 *Burgh Quay, Dublin*—Producers.

Silver lead ore (argentiferous galena), from Shallee mines, Tipperary; exported from Dublin to the river Dee, in North Wales. This ore produces 75 per cent. lead, and from 44 to 54 ounces of silver to the ton.

[The Shallee mines made their first return of lead in 1847, it being then 209 tons of lead ore, which produced 125 tons of lead. Since that time the quantity raised has been regularly increasing.—R. H.]

Silvery-copper ore (argentiferous sulphuret of copper), from Gurtuadyne, near silver mines, county Tipperary; exported from Dublin to Swansea, South Wales. This ore produces 12½ per cent. copper, and about 27 ounces of silver to the ton of ore.

Copper ore (sulphuret of copper), from Ballynoe, near silver mines, county Tipperary, exported from Dublin to Swansea, South Wales. Average produce, about 40 tons per month. This ore produces 25 per cent. of copper. Copper ore, from Lackamore, county Tipperary, similarly exported. This ore produces 36 per cent. of copper.

Specimens of all these ores, as taken from the mine, and as dressed for market.

Rowe, Richard, *Laxey Glen, Douglas, Isle of Man*—
Joint Proprietor.

Silver lead ore, and blende ore, being the produce of the Laxey Mines, in Laxey Glen, parish of Lonan, Isle of Man.

[Mines were worked at an early period in the Isle of Man, but the neighbourhood of Laxey first attracted attention at the commencement of the present century. In 1811, only three hands were employed; in 1848, there were at least 300 in the mine. The mine is situated about a mile and a half from the sea, up the Laxey Valley, where an adit is driven 400 fathoms into the heart of the mountain; from this adit the shaft has been sunk about 130 fathoms. The returns of lead ore for the last five years have been as follows:—

	Lead Ore. Tons.	Lead. Tons.
1845	327	155
1846	220	104
1847	375	247
1848	695	461
1849	815	546

In addition to this, about 200 tons of the sulphuret of zinc are annually raised.—R. H.]

Thomas, John Trotter, *Coleford.*

Specimens of iron ores, from the Forest of Dean.

Rouse, Capt. & Mr. G. N. Simmons, *Truro.*

Articles illustrating lead, from East Wheel Rose, near Truro, Pentire Glaze, near Wadebridge, and other Cornish mines; supplied by Mr. Edward Mitchell and Mr. Nicholas Whitley, of Truro, and other gentlemen.

[Wheel, or wheal, appended to the names of most of the Cornish mines, is a corruption from an old word, probably Cornish, Huel, which was employed to signify a mine.

East Wheel Rose has proved the most productive lead mine in the west of England, the returns of lead from this mine being for a few years as follows:—

	Ore in Tons.	Lead in Tons.
1845	7,883	5,191
1846	4,729	3,114
1847	6,424	3,854
1848	4,758	2,856
1849	5,333	3,191.—R. H.]

Articles illustrating tin, from various Cornish mines (supplied by George Nicolls Simmons, Mr. Henry Borrow, of Truro; Capt. Webb, of St. Austell; Capt. Evans, of St. Agnes; Mr. J. N. R. Millett, of Penzance; and other gentlemen, from Great Beam Mine, near St. Austell, Budnick Mine, in Perranzabulal, Rocks Mine, in St. Agnes, Friendly Mines, in St. Agnes; Mineral Court Mine, in St. Stephen's, and from various mines in the Penzance district), exhibiting the ore in its various stages until it leaves the miner's hands as black-grain tin. A block of white tin very free from impurity, the produce of Mineral Court Mine, supplied by the adventurers, and a rude smelted block of tin supplied by Mr. G. N. Simmons, found in Ladock, near Truro, and supposed to have been smelted when the Phœnicians traded to Cornwall for tin.

[Tin appears to have been raised in Cornwall from a very early period. Traditionary evidence, supported by strong corroborative facts, appears to prove that the kingdoms around the Mediterranean Sea were supplied with tin from Cornwall by the Phœnician merchants at a very early date. The circumstance of this metal being found in the beds of streams, and in deposits at the base of the primary rocks, from which it could be obtained without much labour, may have been the cause of its being early known to the Britons.

The oxide of tin is usually found deposited in beds in water-worn pebbles, and mixed with the debris of the neighbouring hills. There can be but little doubt that these tin deposits are the result of the disintegrating action of the atmospheric causes and of water; some of the tin beds, 30 or 50 feet from the present surface, contain vegetable matter, as branches of trees, and large logs of wood; and at Carnon stream works, human skulls were discovered amidst the debris, 53 feet below the surface.

Tin is also found in the lode, either as peroxide, cupreous-sulphuret of tin, or tin pyrites, the analysis of the peroxide giving—peroxide of tin, 96·265; silica, 0·750; peroxide of iron and manganese, 3·395.

Many indications of early tin-mining are to be found in Cornwall. Peculiar furnaces of a very rude description are sometimes discovered, these are known as Jews-houses, the trade in tin having been for a long period in the hands of the Jews; and blocks of this metal, such as the one exhibited, are called also Jews' tin. For many centuries the Dukes of Cornwall drew a large revenue from the tin produced in the county. The tin when smelted into blocks was forwarded to the nearest coinage town, there to be stamped by the Duchy officers, who cut a piece off the corner of each block, which was retained as the Duchy's dues. In 1337, Edward the Black Prince was created Duke of Cornwall, and then the average profit of the coinage was 4000 marks per annum. In 1814, the revenues to the Duchy from tin was about 8,500*l.*, and the average tin revenue from 1820, to the abolition of the coinages in October, 1838, has been estimated at 12,000*l.*, per annum. In 1750, about 2,000 tons of tin were produced in Cornwall, and in 1838 about 5,000; since that period the quantity cannot be accurately ascertained, the trade in tin being in the hands of a few, and the purchases of ore being usually made by private contract.—R. H.]

EVANS, E., *Oldham.*

Various metalliferous ores, from Anglesea.

[The isle of Anglesea exhibits in the Parys mountain a remarkable accumulation of mineral wealth, of which the ores of copper and lead are by far the most valuable. The former are obtained from the Amlwch copper mines, opened in 1762. The ore is in large masses, or pockets, imbedded in slate, and occurring at first very near the surface, but now worked to upwards of 50 fathoms. At one time, the mines yielded from 60,000 to 80,000 tons of ore annually, but the produce has of late years very much declined. The principal ore is the sulphuret of copper, which is, however, mixed with native copper, the oxide and the carbonate.—D. T. A.]

PATTINSON, —, *Gateshead.*

Tungsten.
Sulphuret of molybdenum.

DAVEY, STEPHEN, *Redruth*—Miner.

Specimens of ores of zinc.

GOODHALE & REEVES, *for the Ringerige Nickel Work, Vigersund, viâ Drammen, Norway*—Proprietors and Producers.

Nickel ore; from mines in the district of Ringerige, in Norway (about thirty miles north-west from Christiana), worked only last year: containing 2·80 per cent. nickel, with 40·46 sulphur, 56·03 iron, and 0·40 copper.

[The Norwegian mines have lately attracted much attention in this country on account of the cobalt and nickel ores they contain.—R. H.]

ROWLANDSON, THOMAS, 7 *Esher Street, Kennington*—Patentee.

Bluestone — a compound of bisulphuret of iron, sulphuret of lead (galena), bisulphuret of copper, sulphuret of zinc (black jack), &c., some silver and gold, obtained at the Isle of Anglesey; also at the Vale of Ovoca, Wicklow, Ireland.

The zinc salts can be converted into chloride of zinc and sulphate of soda; these can be employed in a variety of forms for preserving animal and vegetable substances, deodorizing, &c.

Specimens illustrating the processes by which the sulphuret is converted into sulphate of zinc, which is washed out, and leaves the lead, gold, and silver to be extracted in the ordinary mode by smelting.

Specimens of ores and products from the Cwm-eisian Gold Mine, Merionethshire.

[The existence of gold in many of the rocks of Wales has been long known. There is every reason for believing that the Romans worked the mine at Gogofan, near Pumpsant, Caermarthenshire. This is not only proved by the remains of mine workings, which have been lately examined by the mining geologist to the Geological Survey, but by the gold ornaments which have been found in the Vale of Cothy, near this spot, which are evidently of Roman workmanship. The mine at Cwm-eisian yielded gold disseminated through the quartz, but not being sufficiently remunerative, the works have been abandoned.—R. H.]

BENNETT, THOMAS, 11 *Woodbridge Street, Clerkenwell*—Manufacturer.

Specimen of uniform leaf gold, manufactured by steam machinery, for gilding large plain surfaces, and for exterior decorations; of an extra deep colour, for gilding looking-glasses, cornices, &c.

MYERS, SON, & CO., *Liverpool*—Importers.

Native silver from a mine in the republic of Chili, Province of Atacama, called Descubridora Chanarcillo, the property of Don Francisco Ignacio Ossa, Don Miguel Gallo, and Don Ramon Goyenechea. The specimen was extracted from the vein in the month of August 1850, at a depth of 220 feet. Its weight is 256 marks Spanish, or 154 lbs. 5 oz. English. This mine produces, monthly, 50,000 Spanish marks of silver, equal to about 14 English tons.

[In the Andes of Chili many silver mines exist, chiefly producing ores of an earthy or ferruginous character, known under the name of *pacos*. Native silver is sometimes found, associated with large quantities of native copper in this country. The mine from which this specimen was obtained is one of the most productive. Several curious varieties of silver ore occur in these primary rocks.—R. H.]

SYMONS, ROBERT, *Truro.*

Mining maps.

SYMONS, ROBERT, *Camborne, Cornwall*—Proprietor.

Map of Carn-brea Mine, with sections of Vigurs's Lode, Druid Lode, and Fagur's Lode.

Maps of Camborne and Illogan Mining District; of Tavistock Mining District; and of the Duchy of Cornwall, showing all the mine Setts in the county.

[Carn Brea mine is one of the most important copper mines in the county of Cornwall. It is worked in the granite, and the lodes or veins, of which there are several, contain black copper, vitreous copper, and copper pyrites. The intersections of the mineral veins in this mine very remarkable, particularly showing the extent of dislocation which has at some period taken place in the great granitic mass in which they occur. In 1833 this mine produced but 61 tons of copper ore; in 1849 it produced 10,086 tons; and 9,318 in 1850.—R. H.]

FORBES, ALEXANDER C., 12 *Old Burlington Street.*

Two specimens of Cinnabar, from the mines of New Almaden, in Upper California; one of 14lb. 1oz., the other of 13lb. 2oz. On analysis by Dr. Hoffman, they are found to consist of:—Mercury, 67·25; Sulphur, 10·33; Insoluble matter, 22·55. The insoluble matter consisting chiefly of silica, alumina, and traces of iron. On distillation with lime, 3,750 grains yielded 2,625 grains of mercury, or 70 per cent.

The mine has been worked one year; and in the month of November 1850, it yielded 127,500lbs. of pure mercury. This is exported from San Francisco to the ports of Spanish America.

[Cinnabar is the only important ore of mercury, but is found in several states, sometimes in crystals, in laminated and granular masses, in a fibrous condition, and mixed with bitumen to the extent of 6 or 8 per cent. It is soft: (specific gravity =8·1 when pure), and is a sulphuret of mercury (Hg. S.). The mines of Almaden, in Spain, and Idria, in Carinthia, are those from which the chief supply has hitherto been obtained; but the discovery of mercury in the mountains on the coast of California, some years since, promises to affect the supply very considerably, when sufficient means are employed to work the mines extensively.—D. T. A.]

HALLETT, GEORGE, *Broadwall, Blackfriars*—Manufacturer.

Antimony. Sulphuret ore, from Sarawak, Borneo, Leghorn, Tuscany; oxide ore, from Algeria. Refined sulphuret of antimony, commercially known as "Crude Antimony:" used in medicine, dyeing, pyrotechny, and chemistry.—Metallic antimony, commercially known as "Regulus," with fracture shown; designated as "Best bowl Regulus." Metallic antimony, more highly refined, exhibiting its naturally crystallized, or fernlike surfaces, and its fracture; commercially known as "Best French quality Regulus."—Used principally to harden other soft and ductile metals; viz. with lead and tin for printing types; with copper and tin (and sometimes lead), for Britannia or Queen's metal, pewter wares, &c. Melted with tin, it has of late been used as an anti-friction alloy, for railway axles and other bearings, in metallic rings or collars for machinery, &c. As this alloy is not so much heated by friction as the harder metals, less grease is consumed.

The DUKE of DEVONSHIRE, and his Agent, Capt. EDDY, *Grassington.*

Specimen of the Devonshire lode at Grassington mines.

Specimen of the gritstone, in which the lead occurs.

Veins: specimens from other lodes.

Transverse section of the Devonshire lode.

[The lode in the Grassington mines offers an exception to the common rule of lead veins in England, the whole produce being obtained in gritty beds alternating with the limestone and shale, and not in the limestone, as it usually occurs. The veins worked in this district are generally with faults, and the veinstone is chiefly calc spar, fluor spar, and barytes.—D. T. A.]

JOSEPH, JOSEPH AARON, 7 *Blomfield Crescent, Bayswater.*

A block of copper ore, weighing about 800 pounds, and containing about 45 per cent. of copper, raised from Baker's lode, at Tangkillo Reedy Creek, South Australia, on the special survey of the Australian Mining Company.

Varieties of copper ores raised from the Company's various lodes of ores; minerals, and geological specimens from South Australia, to illustrate the surveyed portion of that colony.

Miscellaneous specimens of minerals.

[The South Australian mines have a peculiar interest from their geological and mineralogical character. The ores of copper are usually of the richest varieties, the peroxide carbonates, green and blue. The South Australian Mining Company possess a territory of 22,000 acres; their principal mining operations are at Tangkillo, where seven lodes are now being explored. Baker's lode has already produced nearly 4,000 tons of copper ore, giving from 12 to 30 per cent. of pure copper. Formerly all the ore was sent to this country to be smelted; but smelting operations are now carried on in South Australia, and the result is very satisfactory to the colony.—R. H.]

LLANGENNECH COAL COMPANY, *Port of Llanelly, South Wales, & 6 Coal Exchange*—Producers.

Specimens of free-burning, smokeless, steam coal, from the Llangennech colliery.

[The Llangennech coal is dull, soft, and fibrous, with irregular fracture, burning to a red ash, and weighing nearly 57 lbs. to the cubic foot. It contains, carbon, 85·46; hydrogen, 4·20; nitrogen, 1·07; sulphur, 0·29; oxygen, 2·44; and ash, 6·54. Like other semi-bituminous coals, it burns without much smoke, and is therefore adapted for use in the Steam Navy.—D. T. A.]

MOORE, JOSEPH, M.D., 10 *Saville Row*—Proprietor.

Iron ore, from the surface of the Arigna mines, on the western side of lake Allen, in the county of Roscommon. Calcined iron ore.

Limestone rock. Fire-clay, used for making bricks for kilns and furnaces. Fire-bricks, made from the same.

Moulding sand.

Specimens of coal found in the locality.

Peat turf, soft and hard. Charred peat for smelting.—Peat, called in Ireland turf, is used as fuel for domestic purposes; it may be used with advantage for smelting the iron ore, having all the effect of wood, and, when charred, of charcoal, which imparts to the iron the properties so highly prized in metal, prepared in wood furnaces.

Bar of iron, from the ore of Arigna. Bar of steel, converted from the same.

Crystallized rock, having a fine fracture, being the surface rock of the district.

Map of the works and section of the mine.

[The river Arigna divides the Connaught coal-field into two parts. The southern division consists of a great mountain ridge called Brahlieve, at the base of which are the Arigna iron works. The rocks within this district are similar to those of other coal-fields, consisting of sandstone, shale, clay-ironstone, and fine fire clay. The shale, which varies in thickness from 300 to 600 feet, rests on limestone rock, and is remarkable for its rich beds of ironstone.

Sir Robert Kane has given the following analysis of the clay ironstone from Arigna:—

Protoxide of iron	54·42
Lime	2·23
Magnesia	2·02
Alumina	1·43
Clay	8·65
Carbonic acid	31·25

The mean of many analyses gives 40 per cent. of metallic iron, as the average produce of the iron ore of this district.

Sir John Guest reported on the Arigna mines in 1804, and stated the cost of production to be as follows:—

	£.	s.	d.
5 tons of raw coal at 6*s.* 4*d.*	1	11	8
4 ,, ironstone, at 6*s.* .	1	4	0
1 ,, limestone . .	0	4	0
Labour	0	10	0
Rent and other charges .	1	5	4
	£4	15	0

Mr. Griffith, in his report on the Connaught coal field, estimates the cost of a ton of iron, produced in this locality, at only 3*l.* 2*s.* 5*d.* The real working cost appears, however, to be somewhat between the two. These statements are important, as directing attention to a very interesting iron-producing locality, which does not appear to have received the notice it merits.—R. H.]

Pimm, Henry, & Co., 29 *Newhall Street, Birmingham*—Manufacturers.

Gold and silver leaf, and bronze powders.

Bawley, P., *Soho, near Birmingham*—Inventor.

Complete model and section of a Staffordshire coal-pit, with apparatus for preventing explosions in coal-mines, by exhausting the combustible gases, and supplying pure air in its place, and for enabling the workmen to ascertain in what state the air is, in the workings of the mine, before going down.

[The thick coal of Staffordshire is worked in a manner altogether different from that adopted either in Northumberland or Yorkshire, as there is constant danger of accident from the fall of the roof, besides that arising from the presence of gas which necessarily accumulates in large quantities in the upper recesses of the mine.

The usual mode of getting the coal, is by sinking a pair of shafts at convenient distances, and extending a pair of levels from the shafts. On reaching the intended limit of working, the coal is removed on one or both sides of the levels, for a distance of about 20 yards wide; but pillars of 7 or 8 yards square are left at intervals for the support of the roof. Between each *side lane* of this kind a larger and more effectual barrier is left 16 or 20 yards wide, and this is called a fire-rib, and serves not only to prevent a crush of the roof, but to allow of a dam being afterwards constructed to confine the gases. A large quantity of coal is left below by this process of mining, amounting sometimes to one-half or even two-thirds of the whole. The ventilation of the thick coal mines is generally imperfect, owing to the large body of air to be moved; but more accidents occur from falls of the roof than from explosions. The workings are generally left in the care of uneducated contractors called *butty colliers*.—D. T. A.]

Waring, Charles Henry, *Neath Abbey, Glamorganshire, Wales*—Inventor and Manufacturer.

Machines for cutting or working coal, &c., horizontally and vertically.

Brynddwey (or Bryndorway) coal. Obtained under a mountain lying between the vales of Neath and Swansea, and about three miles from the sea. The coal known by the name of Graigola is from the same seam.

Anthracite coal—obtained from an eighteen-feet seam under the mountains, on the western side of the vale of Neath, and about twelve miles from the sea.

Sim, William, *Inverary, Scotland*—Manuf.

Inverary granite paving, with kerb, gutter-stone, and causeway stones, all in their respective positions; extensively used in paving the streets of Glasgow.

Granite ballusters of fine-grained granite, from Bonan, Argyleshire. One cubic foot of Inverary granite. Bonan granite, coarse-grained and fine-grained, showing the various descriptions of work generally put on this stone.

Specimens of the form and size of granite causeway stones used for paving. Hand specimens of Inverary granite, Bonan, fine and coarse-grained.

Marquis of Breadalbane's Loch Etive, and Duke of Argyll's Mull granite. The Inverary and Bonan fine-grained granite are chiefly used for paving purposes; the others are used in immense blocks for the heavy masonry of harbours, lighthouses, &c.

[The granite of Inverary consists of distinct patches, protruding through the gneiss. The granite is of fine quality, and much used. It is of two kinds, the one containing mica and red felspar, and the other hornblende and white felspar with the quartz.—D. T. A.]

Gilmour, A., & Co., *Kilmarnock, Scotland*—Proprietors.

Coal from Hurlford and Skerrington Colliery, near Kilmarnock, exported from the port of Troon, and used principally for steam purposes. The colliery has been worked for upwards of forty years. Thickness of seam, 11 feet.

[The Kilmarnock coal field, in Ayrshire, closely adjoins, and perhaps forms part of that worked a little to the south-west at Ayr. The coal is anthracitic for the most part, especially when near the trap dykes that intersect the district; but there are in the neighbourhood many seams of bituminous quality. As much as 150,000 tons of coal are exported from the Kilmarnock district.—D. T. A.]

Ainsworth, Thomas, *Cleator, near Whitehaven*—Proprietor and Manufacturer.

Iron ore (*Hæmatite*) mines in Cleator. No. 1. Pig iron from hematite ore only.

Howard, Thomas, *Bristol*.

Collection of the sands, clays, building stones, coals, metals, and other minerals, belonging to the Bristol basin; a district bounded on the north by Thornbury and Tortworth, on the east by Chipping Sodbury, Bath, and Wells, on the south by the Mendip Hills, and on the west by the Bristol Channel; including a geological range from the Silurian rocks up to the Oolites, with some alluvial and diluvial deposits.

Geological map of England, showing the extent and position of the Bristol basin, relatively to the rest of the country.

Part of the Ordnance Survey of Great Britain, coloured geologically, showing the details of the Bristol district. Sections from north to south, and from west to east.

[The neighbourhood of Bristol is remarkable for the great variety of mineral produce which it yields, and the extended series of rocks observable within a moderate distance.

It presents in the oolites, a series of building stones universally known throughout England; in the lias, a number of useful materials used for lime, cement, and other purposes; in the new red sandstone, mineral soils rich in agricultural produce; in the coal measures, a very large store of mineral fuel; and in the carboniferous limestone, admirable and beautiful building material, adapted for almost every variety of circumstance. The Mendip Hills supply an important series of metalliferous ores, and, in addition to these sources of interest, many illustrations of the extinct natural history of our country are obtained from almost all the formations down to those of the latest date.—D. T. A.]

Bell, Isaac Lowthian, *Newcastle-upon-Tyne*—Manufacturer.

Specimens of magnesia alba, and calcined magnesia.

Specimens to illustrate H. L. Pattinson's patent for the manufacture of a new salt of lead. It is a compound of one atom of oxide of lead united to one atom of chloride of lead, forming a pigment, a portion of which has been employed in painting the building of the Great Exhibition.

Galena, or lead ore, finely ground in water.

Muriatic acid as produced at soda works.

Rough chloride of lead, made from the lead ore by acting upon it with muriatic acid.

Oxichloride of lead, as precipitated by lime, in its dry state, ground in oil.

The residuum left after the chloride of lead is dissolved in water, contains the silver of the original lead ore in the state of chloride of silver.

Plate of silver made from the residuum. Manufactured at the Washington chemical works.

Burnett, Nicholas, *Black Hedley, Gateshead, Newcastle-upon-Tyne*—Producer.

Specimen of clay, found near Black Hedley.

Articles manufactured from the clay, by Messrs. Thos. Fell and Co., Newcastle.

Dickinson, Thomas Friend, *Newcastle-upon-Tyne*—Producer.

Specimen of hœmatite, or kidney ore, exported from Balcarry Bay; used to mix with poorer iron-stone.

[These peroxides of iron vary in the quantities of iron they contain. Where they are crystalline they are usually found to consist—of iron, 70, and oxygen, 30. The uncrystallized varieties are generally not so rich, yielding oxygen, 30·66, and iron, 60·34. These ores afford a considerable portion of the iron manufactured in different countries; they are also, when ground, employed for polishing metals, and used as a colouring material.—R. H.]

Dillon, Viscount Charles Henry, *Loughglyn and Cloonmore Ballaghaderreen, Ireland*—Proprietor.

Specimens of ironstone and bog iron ore, formerly worked to a great extent over a large district, with analyses attached.

Specimens of iron deposit, as found in innumerable small streams over the same district.

Specimens of limestone, from different quarries.

Specimens of coal, as found in a leader in limestone rock, which has been followed to a depth of above 100 feet.

Slabs of yew, oak, and fir, from trees found in the bogs.

Clive, G., and Clay, J., M.P., *Imperial Slate Quarry, Killaloe.*

Specimens of silver lead ores, Cahirglassaun mine, county Galway. The mine is situated between Gort and Kinvara. The largest specimen, weighing about 7 cwts., was taken at the depth of 12 fathoms from the surface.

Jenkins & Beer, *Truro*—Producers.

Lump and powdered ochre, showing shades of colour; raised at Penwethers, near Truro, used for the last seven years, chiefly by painters, paper-stainers, and paper-makers.

Jenkins & Courtney, *Truro*—Producers.

Specimens of Cornish china-stone; exhibiting its natural fracture: raised in the Great Bodilla China-stone quarries, St. Stephen's, Cornwall, and largely used in the potteries for the manufacture of the finer descriptions of china and earthenware.

[China-stone and china-clay, both of which are most extensively used in the potteries, are produced in the neighbourhood of the great granite ranges of Cornwall and Devonshire: in the former county chiefly from the St. Austell granite, and also from Tregorming Hill to the south of Helstone, and from the southern granite of Dartmoor in the latter county. The decomposed granite of St. Stephen's, and the uses to which it and the clay produced from it could be applied, were discovered in 1768 by Cookworthy of Plymouth, who was the first person who made hard porcelain in this kingdom. To this discovery is due entirely the manufacture of porcelain, similar to that of China.

The composition of this kaolin, or porcelain clay, varies in different localities, the average of the best Cornish clay giving an analysis—alumina, 24·6; silica, 44·30; lime, magnesia, and potash, 1·60; water, 8·74. The pure kaolin of Dartmoor being, alumina, 36·81; silica, 44·25; lime, magnesia, and potash, 2·20; water, 12·7.

With the increase of our porcelains and fine earthenware manufacture, the demand for these clays has largely increased; and to this must be added a large trade in the china-stone itself, which is used principally for glazing fine ware, the ordinary glaze being composed of decomposed granite, lime, flint, litharge, and borax.

A large quantity of this clay of an inferior quality is used by the paper-makers and calico-dressers, for the purpose of giving weight and body to their fabrics.

Men, women, and children are largely employed on these clay-works, which, when the clay is being dressed, present a scene of active and curious industry.—R. H.]

Graham, John, *Barrhead, near Glasgow.*

Greenstone, showing native copper, as found in the rock when broken. Native copper, as found in the fissures and crevices of the rock, from Boyleston quarry, Renfrewshire.

[The greenstone of Renfrewshire occurs both above and below the coal-grits and coal. It is an intruded rock of variable but often very considerable thickness and extent, and is likely to contain small quantities of various metalliferous substances and native metals.—D. T. A.]

White & Grant, *Dalmarnock Road, Glasgow*—Inventors and Manufacturers.

Patent safety cage and detaching catch for mine-shafts, to prevent accidents from the breaking or over-winding of ropes or chains.

Sutcliffe, John Clarkson, *Barnsley.*

Model of Honey Well Colliery, Barnsley, showing the manner in which it is worked and ventilated.

[The method of working coal, adopted in the Yorkshire mines generally, is that known as the *long wall*, and is distinguished from the Newcastle, or *pillar-and-stall* method, by extracting at once all available coal, instead of first taking a small proportion and leaving the rest in the form of pillars. The selection of the method of working should depend on the conditions of the mine; and generally the long-wall system may be considered admissible where ironstone occurs with the coal, the coal being thin or the floor and roof soft, the royalty small, the general superincumbent mass compact, and the water not very troublesome.

When, however, there is much gas, where the coal is deep and the quantity to be extracted from one set of workings very considerable, and the water troublesome, it cannot generally be recommended.

In working the long-wall method, it is usual to put a pair of levels from the shafts, and carry drifts at once to the extremity of the intended workings; and then, removing the coal from the end, the roof is allowed to fall, leaving only an air-way round the outside of the fallen mass (*gob*), cut in the solid coal. The gob is often partly filled with the rubbish removed in getting the coal.—D. T. A.]

Watson, Henry, *Newcastle-upon-Tyne*—Manufacturer and Inventor.

Sir Humphry Davy's, Mr. George Stephenson's, and

Dr. Clanny's safety-lamps, used in the coal mines in this district.

The steel mill used for producing light before the introduction of the safety lamp.

[The steel mill consists of a circle of steel, which, being made to revole rapidly, struck against a piece of flint, and thus produced a succession of brilliant sparks, and afforded a light. These incandescent particles were not sufficiently heated to ignite the fire-damp of the coal mines, a carburetted hydrogen gas, mixed with atmospheric air. This rude apparatus was therefore long employed as the only means of illumination in dangerous levels. Sir Humphry Davy discovered that flame would not pass through wire gauze, although the gases previously to ignition passed with great facility. Hence, surrounding a flame with wire gauze, putting it into a cage, constitutes the "Davy," as the miners term it, or safety-lamp. The explosive gases pass in through the wire to the flame, and are ignited by it; but the combustion is not communicated to the gases on the outside of the cage. It has, however, been sometimes found, that strong jets of gas would drive by mechanical force the flame through the wire, and thus an element of danger still remained. Mr. Newman made the "Davy" with a double gauze: this lamp appears perfectly safe; but it affords a small amount of light. Mr. Stephenson's lamp does not differ essentially from that of Davy. Dr. Clanny's lamp and some others are modified forms, in which security from explosion is sought to be obtained, together with an increased quantity of light.—R. H.]

PAGE, J. R., *Athenæum*—Proprietor.

Specimens of ironstone, from the Leitrim coal and iron basin. Also some specimens of the same in a washed state.

Small pieces of the iron, from the same, reduced by means of peat charcoal.

WESTERN GAS LIGHT COMPANY, 9 *Holles Street, Cavendish Square.*

Specimens of the Newcastle cannel coal, from which the gas supplied by the Western Gaslight Company to the building of the Great Exhibition is made.

Specimens of the cannel coke, produced in the manufacture.

MITCHELL, Rev. W., A.M., *Woolwich*—Inventor and Manufacturer.

Specimen of coal, or bituminous mineral.

Vase, from the same.

Pillars, with statues of Her Majesty and Prince Albert.

Box, for holding postage stamps. Stamp for sealing letters. Railway or sea chessboard and men. Snuff-box, as made from raw material. Snuff-boxes, polished. Box, with bracelets; another with backgammon men; and one with shirt buttons. Razor and knife hones.

The specimen of coal exhibited has recently been discovered near Edinburgh, and can be applied to the fine arts. It is of a brownish colour, and ignites with facility: it does not soil the hands: and it admits of a brilliant polish.

PROTHERO & PRICE, *Tillerey, near Newport, South Wales*—Producers.

Steam coal, from Tillerey, near Newport, Monmouthshire, the produce of a newly opened colliery (in the South Wales coal basin), upon the steam-coal vein, "the Elled," a 5-feet vein; the "big coal," an 8-feet vein; and the "¾ coal," an 8-feet 7-inch vein; all of superior quality.

The coal is obtainable in masses of 50 tons weight, and is adapted for steam purposes, and for exportation.

WANDESFORDE, Hon. CHARLES, *Castlecomer*—Proprietor.

Specimens of Anthracite coal. Iron-stone. Fire-clay for fire-bricks. Slate-clay, for flooring-tiles, milk-pans, flower-pots, &c. Clay for making draining-tiles. Sand, for fire-bricks and moulding.

OAKEY, JOHN, 130 *London Wall*—Importer.

Specimens of magnetic iron, of peroxide of iron, of peroxide of manganese, and of micaceous iron, from Penrice, near Adelaide, South Australia, the property of Captain Rodda.

PHILLIPS, JOHN, F.R.S., *St. Mary's Lodge, York*—Inventor.

Pedestal, or block of stone, coloured by infiltration. Intended as a substitute for marble.

HODSON, Sir GEORGE, Bart., *Hollybrooke Bay, County Wicklow, Ireland*—Proprietor.

Specimens of porcelain clay, from Sugarloaf mountain.

SANDERSON, THOMAS JOSEPH, *Sheffield*—Manufacturer.

1, 2, 3. Anvil for the use of engineers, blacksmiths, and farriers.

4. Anvil for exportation.

5 6. Bright and black vices, for blacksmiths.

7. Bright saw vice.

JAMES, JOHN, *Blaina, near Abergavenny, Wales*—Inventor.

Model of a blast furnace for smelting iron ore.

["Smelting" is the process of reducing an ore to the state of a metal. The ore is first calcined or roasted by being burned with coal in the open air, until the water, sulphur, and carbonic acid are driven off; which, if not separated before going into the furnace, would injure the quality of the iron. The roasted ore, coke for burning, and limestone for a flux, are then thrown into the furnace, in the proportions of 14½ tons of coke, 16 of roasted ore, and 6¾ tons of limestone for every 7 tons of metal required. The "blast" is the stream of air thrown into the furnace by machinery, for promoting rapid combustion; the pipes conveying the "blast" are called the "tuyeres" and the ends from which the air issues are called the "nose pipes," or "nozzles." Some of the large Welsh furnaces contain 150 tons of ignited material, and 20,000 cubic feet of air is forced into them per minute.—S. C.]

WALLACE, WILLIAM, *Nenthead, Alston*—Proprietor.

Carbonate of lead, from Little Eggleshope Lead Mine, in Teesdale, county of Durham.

WALTON, J., *Greenends, Alston*—Proprietor.

Various specimens of crystals and minerals:—

Pyramidal quartz; ruby blende or limestone; stalactitical drusy quartz; amber fluor spar, with pearl spar and copper pyrites; dodecahedral galena and blend on quartz; carbonate of lime on amber fluor, quartz spar, and pearl spar on sulphate of zinc, from Bromley Hill, Alston.

Carbonate of lead, from Thorngill Alston.

Lead ores from Greensides.

CUMMING, J. G., *Isle of Man.*

Argentiferous galena, from the Foxdale Mines, containing 36 ounces of silver to the ton.

[This lead ore is procured from a granite vein, running N.N.W. and S.S.E., nearly magnetic; it improves in quality, and increases in quantity downward, which is an unusual occurrence. It is now being worked at 50 fathoms from the surface.—R. H.]

THORNE, WILLIAM, *Barnstaple*—Proprietor.

Pseudomorphic spathose iron, showing the structure of box and slipper specimens; yellow sulphuret of co peacock copper; foliated mundic and crystallized white quartz; from the Virtuous Lady Mine, near Tavistock, Devon.

[These singular formations are due to the deposit of the sulphuret of iron upon crystals of sulphate of lime, which have been dissolved out subsequently. They have been rarely met with in any other mine.—R. H.]

Crystallized white iron, with lead and Fahlertz ores, containing silver from the Combmartin Mines, in North Devon.

Specimens of killas, or clay slate, white iron, crystallized white quartz, mundic, and lead and Fahlertz ores, from the Wheal Golden Mine, Perranzabulow, Cornwall.

Hydraulic cement and raw mineral paint, from Bickington Quarry, near Barnstaple, Devon.

Ashlar-stone, hone-stone, clay, and granite gravel, from Tavistock, near Barnstaple.

TUSTIAN, JOHN, *Melcombe, near Banbury*—Manufacturer.

Petals of the red rose. Confection of the red rose. Extract of henbane.

HIGHLEY, SAMUEL, jun., 32 *Fleet Street*—Importer.

Collection of rocks and fossils, stratagraphically arranged, to illustrate modern works on geology; from Dr. Krantz's establishment at Bonn.

THE LINARES MINING ASSOCIATION, *Offices in London*, 2 *New Broad Street*—Proprietors.

Four specimens of lead ore from the mine of Pozo Ancho at Linares, in the province of Jaen, Spain.

[The Linares mines were worked half a century since, and abandoned; but, since the processes now employed for desilverizing lead have been introduced into Spain, these, and many other lead and silver mines have been put into active operation.—R. H.]

MITCHELL, WALTER, *St. Bartholomew's Hospital*—Designer and Inventor.

Series of models in paper, representing all the primary and secondary forms of crystals, and the most important combinations of these forms.

BEDFORD, BONSON, DRAKE, & Co., *Oaks Quarry, near Barnsley*—Producers.

Grindstones from the Oaks Quarry, near Barnsley, 8 feet in diameter and 14 inches thick, for grinding machinery; 4 feet in diameter and 6 inches thick, for grinding tools; 2 feet 6 inches in diameter and 9 inches thick, for grinding files.

CAIRNS, J., 9 *Charlotte Street, Manchester.*

Carbonate of baryta, with specimens of lead ore, from Anglezark Moors, near Chorley, Lancashire.

HARVEY, —, *Tavistock.*

Specimens of copper and lead.

JOHNSON, SIMPSON, & SIMONS, 10 *Little Britain*—Manufacturers.

Portion of a cake of fine silver, from the lead mines in Cornwall. Fine copper, used to alloy silver in making wire. Fine gold leaf, for gilding silver when alloyed.

WORKMAN, JOHN, *Stamford Hill*—Inventor.

Water-proof bricks, for building dwelling-houses, factories, tanks, baths, reservoirs, &c., with samples of other bricks.

AZULAY, BONDY, *Rotherhithe*—Inventor.

A Berlin pattern, printed in one colour, from which needlework of various colours and shades can be worked. On a sheet of paper are glued single threads of wools, the shades of each colour, in rotation. The colours are lettered, and the shades numbered; the squares in the pattern are then filled in with a number and a letter, according to the particular shade of colour required.

New pattern for dissecting puzzles; the pictures in geometrical figures.

Hot water bottle bath; with double sides, and between them a non-conducting substance. Gas-stoves.

A washing-copper and trough, heated by gas; the water keeps hot the whole time of washing, and is regulated at pleasure.

Flat-irons heated by gas.

Window-roller bracket spring. The roller may be released without cutting the cord. Should the cord break, the roller cannot jump out of bearing, as there is no slit.

BERGER, FREDERICK, 12 *Cornhill.*

Specimens of native red and grey-copper ores, from Trenance mines, Cornwall. These deposits were taken from the lode now working in the serpentine formation, being part of a slab of copper of 30 feet in length; produce 96 per cent. The grey ore produces 78 per cent.

[The general condition of copper in the serpentine rocks is curious. Fissures running through these rocks are filled in with heterogeneous matters, an occasional slab of native copper being found in the crack. It has not hitherto been usual to discover more than a few isolated patches of copper ore; and Trenance mine, on the junction of the serpentine with the Hornblendic slate, is a remarkable exception, producing native copper, the grey sulphuret of copper, and the red oxide of copper.—R. H.]

CRUTTWELL, ALLIES, & Co., *Cwm Celyn and Blaina Iron Works, Abergavenny*—Manufacturers.

Pieces of pig-iron, forge pig-iron, and refined metal; and cinder, or scoria, produced from them.

Puddled, merchant, and beat bar iron, with scoria.

Finished rail, showing fracture.

Specimen of sigillaria, from the lower coal measures, Cwm Celyn and Blaina Iron works.

Rails connected, showing a new mode of fastening. The mode of riveting the rails to the chairs with lateral pins or rivets is the patent invention of H. D. Bird, Esq., of Petersburg, Virginia.

BOURNE, T. R., & Co., *Whitby*—Manufacturers.

Alum. Sulphate of alumina, from Peat's alum works, near Whitby.

MORPHET, JONATHAN, *Studfold, near Settle*—Producer.

Specimens of stone called blue flag, or Grauwacke. Obtained from Horton Wood quarries, which have been worked probably about 100 years. This stone is principally used for cisterns and partitions, and is useful for curriers' tables, tanks, &c.

The quarries are about six miles from the Settle Station of the North Western Railway.

BAGNALL & GESSON, *West Bromwich, near Birmingham*—Producers.

Column of South Staffordshire thick coal—showing the different working seams as they exist in vertical section.

MITCHELL, W. B., *Sheffield.*

Sandstones, for purposes of construction, and grindstones.

1. Millstone grit—Bull Hill Quarry. 2. Millstone grit—Reeves' Edge Quarry. 3. Blue sandstone—Green Moor Quarry. 4. Brown sandstone—Green Moor Quarry. 5. Blue sandstone—Brinkcliffe Edge Quarry. 6. Brown sandstone—Grenoside Quarry. 7. Brown sandstone—Wickersley Quarry. 8. Magnesian limestone—Steetley Quarry.

Clay.

9. Fire clay and brick—Dore Moor Mine. 10. Fire

clay, for crucibles—Storr's Mine. 11. Balbro brick clay; pressed brick.

Coals.

12. From Soap House Colliery—Sheffield Bed. 13. From Birley Vale Colliery—Sheffield Bed. 14. From Mortomley Colliery—Sheffield Bed. 15. Handsworth converting coal. 16. Tinsley Park high hazel coal. 17. Tinsley Park furnace coal.

Brown, Rusby, & Booth, *Sheffield*—Producers and Manufacturers.

Flags and steps.
Block of sandstone, weight four tons.

Dalton, John, 48 *Summer Hill, Dublin.*

Mineral specimens, from Clonmore, County Mayo, Ireland, comprising:—

1. Clay iron-stone.
2. Clay iron-stone, once fluxed.
3. Bog-iron ore, analysed as containing 69·2 of oxide of iron, equivalent to about 48·2 of pure iron; it abounds in Clonmore, the estate of Mr. Phillips, and in the adjoining estate of Viscount Dillon.
4. Clay iron-stone, refined into iron in a common smith's forge, with turf.
5. Coal from one leader, 8 inches in thickness.
6. Coal from another four-feet leader, both in the same townlands.

Grissell, Thomas, 11 *New Palace Yard, Westminster*—Producer.

1. Specimen of magnesian lime stone, used in the construction of the New Houses of Parliament, Westminster, from quarries at Auston, in Yorkshire, belonging to the exhibitor, on the estate of the Duke of Leeds.
2. Specimen of this stone, dressed and polished.

Specimen of the same stone, forming part of an enriched parapet, at the New Houses of Parliament, Westminster.

[The magnesian limestone used in the outside work of the Houses of Parliament was selected on the recommendation of a Royal Commission, and after careful examination, as the finest available material to be obtained. It is a compact semi-crystalline rock, consisting of nearly equal proportions of carbonate of lime and carbonate of magnesia. It is of uniform and elaborate hardness; not very costly, either to obtain or work; weathers well, and of good colour, and is remarkable for its power of resisting compression. It is much heavier than most limestones, weighing upwards of 150 lbs. to the cubic foot.—D. T. A.]

Redruth Local Committee, *Redruth*—Collectors.

Specimens of copper ore from various mines in Cornwall: illustrations of the various processes it undergoes in preparation for the market, together with the methods for determining the per centage of pure copper. Specimens of the stratum in which the ore is found.

No.	Description of Ore.	Mine.	Parish.	Stratum.
1	Yellow ore . . .	Alfred Consols	Gwinear	Slate.
2	Yellow with fluor-spar.	Wheal Buller.	Redruth	Granite.
3	Yellow ore . . .	Tywarnhayle .	Illogan .	Slate.
4		Wheal Buller.	Redruth	Granite.
5		East Crofty .	Illogan .	Slate.
6		Treviskey . .	Gwennap	Granite & Slate.
7		South Frances	Illogan .	
8	Yellow, grey, and black	Carn Brea . .	Illogan .	Granite.
9	Grey ore . . .	Treviskey . .	Gwennap	
10	Grey ore . . .	South Bassett.	Illogan .	
11	Black and grey . .	South Frances	Illogan .	
12	Black in Gosan . .	Wheal Buller.	Redruth	
13	Black in Gosan . .	South Frances	Illogan .	

[The county of Cornwall is the most important mineral district of the United Kingdom, for the number of its metalliferous minerals, many of which are not found in any other part of our islands. At a very early period of our history, mines were worked around the sea-coasts of Cornwall, of which the evidences are still to be seen at Tol-pedden-Penwith, near the Land's End; in Gwennap, near Truro; and at Cadgwith, near the Lizard Point. The traditionary statements that the Phœnicians traded for tin with the Britons in Cornwall, are very fairly supported by corroborative facts; and it is not improbable that the *Ictes*, or *Iktis*, of the ancients was St. Michael's Mount, near Penzance.

In the reign of King John, the mines of the western portion of England appear to have been principally in the hands of the Jews. The modes of working must have been very crude, and their metallurgical processes exceedingly rough. From time to time the remains of furnaces, called *Jews' houses*, have been discovered, and small blocks of tin, known as *Jews' tin*, have not unfrequently been found in the mining localities.

Till a comparatively recent date, tin was the only metal which was sought for; and, in many cases, the mines were abandoned when the miners came to the "yellows," that is, the yellow sulphuret of copper. The greatest quantity of tin has been produced by "streaming" (as washing the dèbris in the valleys is termed); and this variety, called "stream tin," produces the highest price in the market.

The conditions under which these deposits occur, are curious and instructive. At the Carnon Tin Stream Works, north of Falmouth, the rounded pebbles of tin are found at a depth of about 50 feet from the surface, beneath the bottom of an estuary, where trees are discovered in their place of growth, together with human skulls, and the remains of deer, amidst the vegetable accumulations which immediately cover the stanniferous beds. According to Mr. Henwood's measurement, the section presents first about 50 feet of silt and gravel; then a bed of 18 inches in thickness of wood, leaves, nuts, &c., resting on the tin ground, composed of the débris of quartz, slate, and granite, and the tin ore. At the Pentuan Works, near St. Austell, similar deposits occur, proving a material alteration in the level during the period expended in the formation of this deposit. Tin is also worked out of the lode in many parts, the ore occurring both in the slate and the granite formations. The modes of "dressing" the tin ore, preparing it for the smelter, and the processes of smelting, are illustrated in the Exhibition.

There has been a remarkable uniformity in the quantity of tin produced in Cornwall during a long period, as will be seen from the following table:—

		Price per Cwt.	
	Tons.	£.	s.
1750	1,600	..	
1760	1,800	..	
1770	2,000	..	
1780	1,800	3	0
1790	2,000	3	15
1800	1,500	5	0
1810	1,400	7	0
1820	1,700	3	5
1830	3,500	3	0
1840	5,000	3	15

The produce of this metal within the last few years has been as follows:—

	Tons.
1844	7,507
1845	7,739
1846	8,945
1847	10,072
1848	10,176
1849	10,719

The copper mines, now so important, were so little worked until a recent period, that in 1799, we are told in a Report on the Cornish mines, that "it was not until the beginning of the last century that copper was discovered in Britain." This is not correct, for in 1250, a copper mine was worked near Keswick, in Cumberland. Edward III. granted an indenture to John Ballanter and Walter Bolbolter, for working all "mines of gold, silver, and copper:" but that the quantity found was very small is proved from the fact, that Acts of Parliament were passed in the reigns of Henry VIII. and Edward VI., to prevent the exportation of brass and copper, "lest there should not be metal enough left in the kingdom fit for making guns and other engines of war, and for household utensils:" and in 1665, the calamine works are encouraged by the Government, as "the continuing these works in England will occasion plenty of rough copper to be brought in."

At the end of the seventeenth century, some "gentlemen from Bristol made it their business to inspect the Cornish mines, and bought the copper for two pounds ten shillings per ton, and scarce ever more than four pounds a ton."

In 1700, one Mr. John Costar introduced a hydraulic engine into Cornwall, by which he succeeded in draining the mines, and "he taught the people of Cornwall also a better way of assaying and dressing the ore."

The value and importance of the copper mines since that period has been regularly increasing. During a term of about 30 years, 220 mines have sold their ores at the public sales. The following table, from a report by Sir Charles Lemon, Bart., M.P., represents the progress of copper mining, from 1771 to 1837:—

Years.	Tons of Ore.	Tons of Copper.	Total Value of Ore.	Standard Value per Ton.
			£.	£.
1771	27,896	3,347	189,609	81
1780	24,433	2,932	171,231	83
1799	51,273	4,223	469,664	121
1800	55,981	5,187	550,925	133
1802	53,937	5,228	445,094	111
1805	78,452	6,234	864,410	170
1808	67,867	6,795	495,303	100
1809	76,245	6,821	770,028	143
1812	71,547	6,720	549,665	111
1814	74,322	6,369	627,501	130
1816	77,334	6,697	447,959	98
1818	86,174	6,849	686,005	135
1821	98,426	8,514	605,968	103
1825	107,454	8,226	726,353	124
1827	126,710	10,311	745,178	106
1831	146,502	12,218	817,740	100
1837	140,753	10,823	908,613	119

The produce of the copper mines of Cornwall, since 1845, has been as follows:—

	Ore in Tons.	Copper in Tons.	Money Value. £.	s.
1845	162,557	12,883	919,934	6
1846	150,431	11,851	796,182	6
1847	155,985	12,754	889,287	0
1848	147,701	12,422	720,090	0
1849	146,326	11,683	763,614	0
1850	155,025	12,254	840,410	0

With the improvements in the construction of the steam-engine, the facilities for working the mines have been increased. The first steam-engine employed in the county, was set to work at Huel Vor Tin Mine, near Helstone, in 1713, by Newcomen; but it was not until the reconstruction of the engine by Watt was effected, that steam power was generally employed for draining the mines. The rapid advance made by Cornish engineers in the perfection of their engines will be seen by the following return of the duty, that is, the performance of each, which is reckoned by the number of millions of pounds lifted a foot high by the consumption of a bushel of coals:—

Name of Mine.	Highest Duty.
Stray Park, 1813 . . .	29,000,000
Dolcoath, 1816 . . .	40,000,000
Consolidated Mines, 1822	44,000,000
Consolidated Mines, 1827	67,000,000
Fowey Consols, 1834 . .	97,000,000
United Mines, 1842 . .	108,000,000

A brief statement of the quantity of coals consumed per month, in a few of the principal mines, will show the extent to which steam power is now employed.

	Bushels of 94 lbs.
Fowey Consols, 1835 . . .	101,246
Godolphin, 1839	129,801
Fowey Consols, 1840 . . .	203,699
United Mines, 1842 . . .	84,862

Two examples of Cornish engines may be seen near the Metropolis, one at the East London Water Works, and the other at Brentford.

The lead mines of Cornwall have produced of the argentiferous sulphuret, during five years, the following number of tons of ore:—

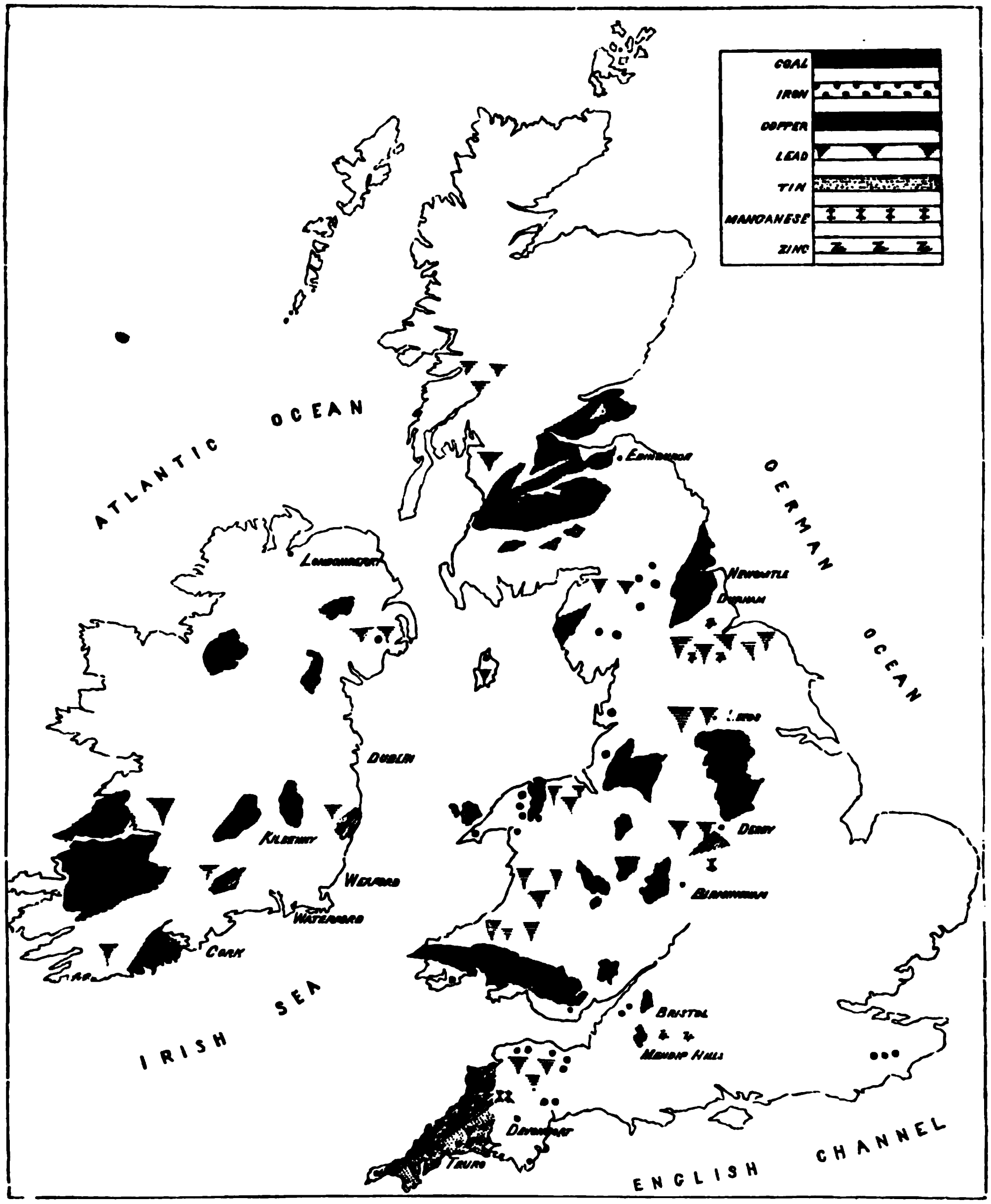
	1845	1846	1847	1848	1849
Callington . . .	930	1,138	1,249	957	625
Huel Mary Ann . .	..	166	192	334	673
Cornubian . . .	420	..	..	..	..
E. and W. Haven .	16	..	..	..	..
Huel Trelawney . .	280	529	883	413	1,296
Camelford . . .	180	..	..	..	..
E. Huel Rose . .	7,883	5,191	6,424	5,333	4,753
N. " . . .	..	..	84	80	75
Cargol	65	306	954	964	505
Oxnams . . .	..	183	47	470	269
Huel Rose . . .	57	375	378	399	107
" Penrose . .	116	11	..	..	..
Holmbush . . .	..	12	60	154	102
New Quay . . .	73	..	..	..	..
Porthleven . . .	8	82	..	.	..
Pentire	..	34	..	..	..
Cubert	..	136	354	68	..
Leman	..	30	73	..	..
Huel Concord . .	..	30	30	..	..
Huel Trehane . .	..	..	312	..	459
Herodscoombe . .	..	..	37	..	..
Herodsfoot . . .	..	..	375	721	1,030
Great Callestock Moors	..	..	109	..	..
Callestock . . .	..	..	116	179	..
Treyorden . . .	..	..	..	..	28
Huel Penhale . .	..	..	..	..	50
" Golden . .	..	..	..	..	80
Cartheu Consols . .	..	..	..	..	45

The produce of zinc is not easily attainable, but it is now somewhat considerable, as is also that of arsenic, and of the iron pyrites, used in the manufacture of sulphuric acid.

The number of individuals employed in 59 Cornish copper mines, was computed by Sir Charles Lemon, in 1837, to be—

Men	10,624
Women . . .	3,802
Children . . .	3,490

The men alone work underground; the women and



21. MINERAL MAP OF THE UNITED KINGDOM, BY ROBERT HUNT.

ı are employed on the surface, picking and dressing
.
V. J. Henwood estimates the number employed

Men	18,472
Women . . .	5,764
Children . . .	5,764
	30,000

e the minerals peculiarly industrial, a very large
of beautiful mineralogical specimens are produced
county. A large trade in Kaolin—china clay—is
on; and of the building and ornamental stones
wall, granites, slates, porphyries, serpentines, and
nds, a considerable variety in the natural state,
ought into articles of use and ornament, will be
n the Exhibition. The accompanying map is
l to furnish information as to the metalliferous
wealth of Great Britain generally, and the site of
mines is represented by symbols which will
he map intelligible as a means of reference in
the metalliferous minerals in Class 1.—R. H.]

'HE LESSEES OF THE STANHOPE LIMESTONE QUARRIES—Proprietors.

ıed specimens of the cockle strata in the car-
us limestone; from Weardale in the county of
.
nen of the same in the rough state.
lime manufactured from this stone is valuable
ricultural manure. It is used as a flux in smelt-
ore; also for purifying gas; for tanning and for
ıemical purposes. The analysis is as follows,

Carbonate of lime . .	95·1
Carbonate of magnesia	2·5
Earthy matter . . .	1·3
Residuum	1·1
	100·0

HARTLEY, JAMES, & Co., *Sunderland*—Manufacturers.

rough-plate glass of improved surface, ⅛th of an
k; 30 oz. to the square foot; for ridge-and-furrow
f conservatories, factories, and for general pur-
Larger sizes are obtainable in this rough plate
d previously be procured in glass of similar qua-
ss substance than a quarter of an inch. For
tories it is considered valuable for its diffusing
and requiring no shading to prevent the scorch-
n of the direct sun-rays, as in the employment
ry sheet-glass.
ı of ridge and furrow roof 10 feet span, glazed
same, in squares 62 by 18 inches.
, &c., illustrating the manufacture of crown
glass:—Model of a glass-house, the "cone"
de of glass, with model of an eight-pot furnace,
e 1½ inch to a foot.—Melting pot, full size; spe-
ı the various stages of manufacture, &c.
of a green-house on the ridge and furrow flat-
inciple: the ridges being formed of single squares
lap-joint.
en windows of patent rolled coloured glass.
ens of stained-glass borders; various kinds of
glass, illustrated by a pattern in which no enamel
re employed.
ens of various articles for horticultural and
poses; glass for railway purposes, &c.

ORTHINGTON, WILLIAM, *Northwich, Cheshire*—Proprietor.

ens of rock salt, as produced from the mines,
hwich, Cheshire.

Specimen of refined salt, for curing fish.

Fine high-dried table salt.

Malvern salt, much esteemed for table use.

Large-grained bay salt, used for various purposes.

[The salt-mines of Cheshire are worked in the new red sandstone of that county, the salt being in large masses of irregular form associated with marl and gypsum. In its natural state it is of dull red colour, semi-transparent, and though sometimes cubical in crystal, more usually massive. The number of saliferous beds in the district is five, the thinnest of them being 6 inches, but thickest nearly 40 feet thick, and they are worked at a depth of from 50 to 150 yards below the surface.

The mode of working the thick bed is not much unlike that adopted in South Staffordshire for coal; but the roof being generally uniform and tolerably tough, and the mine without noxious gases, the works are more simple. The salt is blasted, and large pillars are left to support the roof. Upwards of 60,000 tons of salt are obtained from the Cheshire mines, and a large quantity is also manufactured from brine-springs and other similar sources, in Cheshire and Worcestershire. The greater part is exported from Liverpool.—D. T. A.]

WHITE, HENRY, *Dunstable, Bedfordshire.*

Chalk, from the Downs of Dunstable.

Whiting, or chalk in a refined state.

WHITEWAY, WATTS, & Co., *Wareham, Dorsetshire, also of Kingsteignton, Devonshire*—Producers.

Blue clay, used in potteries, raised from the pits called Furzebrook, near Wareham, Dorsetshire.

Black clay, for pottery purposes.

Pipe clay, for making tobacco pipes.

Top clay, for brown stone-ware purposes.

Draining clay, for draining tiles, from the pits at Kingsteignton.

WHITTAKER, JAMES, *Worksworth, Derbyshire*—Proprietor.

Specimens of marble, and vase made of the same.

Specimens of grit sand, used for fine castings.

White sand, used for scouring, &c.

White lead ore, and stalactite.

BAMPTON, JOHN AUSTIN, 49 *Union Passage, Birmingham*—Inventor and Manufacturer.

Specimens of a material produced from the mixture of moss or peat, in certain proportions, with sawdust, &c. It is subjected to a pressure of 800 tons, to make it fit for use; it then becomes hard and durable, and capable of being polished and worked.

Plastic material made from moss and lime, which has been submitted to a heat of 160 degrees without showing any crack or flaw; it can be used in a sheet or plastic state. Gypsum and cements may be used in producing similar articles.

Specimens of compressed moss fibre.

[It has long been known that moss or peat, either alone or mixed with other vegetable or mineral substances, was capable of great compression, and sometimes exists in nature in an extremely dense, hard, and brittle state. In the manufacture of the materials above mentioned, advantage has been taken of the force of cohesion by bringing the particles of bodies into close contact under enormous pressure.—D. T. A.]

BETTS, EDWARD LADD, *Aylesford, near Maidstone*—Proprietor.

Products and manufactures from the Preston Hall estate, valley of the Medway, near Maidstone, Kent:—

White and grey chalk and lime. Plastic clay: bed 75 feet deep. Cement, usually called Portland cement. Terra cotta vase. Registered terra cotta bricks, ornamental. Stone-ware drawing pipes, glazed and unglazed. Agricultural pipes. Patent hollow bricks. Kentish rag-stone, for building. Fullers' earth. Silon sand, for glass making. Soft (or potters') sand.

[The neighbourhood of Maidstone presents to the geologist and agriculturist some variety of deposit and soil, extending from the chalk through the intervening beds of the middle and lower cretaceous series to the Wealden deposits. The chalk itself, both white and grey (upper and lower), is present a little to the north; the upper greensand and gault (a clay of considerable thickness), come out beneath the chalk and towards the valley of the Medway, while the lower green sand, on which Maidstone is built, succeeds in regular order. The lower green sand presents three divisions—the upper being sandy, the middle more marly, and the lower containing many hard concretionary portions interstratified with purer clays. Amongst the hard portions, are the beds of Kentish rag, and amongst the purer clays, the beds of fullers' earth, which, however, are chiefly worked a little to the west, at Nutfield, near Reigate. The Kentish rag is a well-known and useful building material, of which extensive quarries have long been worked at Boughton, near Maidstone. The harder bands, cemented by a calcareous cement, alternate with looser portions (hassock), which pass occasionally into chert.—D. T. A.]

ADAIR, R., *Maryport*—Manufacturer.

Various materials used in black-lead pencil making; with specimens of pencil manufacture, in its different stages.

The cedar used is imported into London and Liverpool chiefly from South America. The foreign plumbago, of which common pencils are manufactured, is imported from Germany, the East Indies, Spain, and Mexico. The Cumberland black-lead is found only in Borrowdale, and is used only for the best pencils.

From His Grace the Duke of BUCCLEUCH,
Drumlanrig Castle.

Model of the furnaces and pots employed on the exhibitor's mines, at Wanloch Lead-hills, in Dumfriesshire, for separating pure silver by a process, from the rich lead ore of that district.

The following illustrations accompany the model.

A block of pure silver, weighing more than 120 lbs.; separated from the rich lead, and purchased by silversmiths as "unalloyed."

(*a*) Original lead as brought from the mines after smelting, containing 7 oz. 9 dwt. 8 grns. of silver.

(*b*) Crystals of lead after passing through one process of crystallization.

(*c*) The same, after a second crystallization.

(*d*) Rich lead, containing 81 oz. 1 dwt. 8 grains of silver; and now ready for the last process of oxidization, by which the silver is finally separated from the lead.

(*e*) Marketable lead from the crystallizing process; and which contains from ½ to ¾ of an ounce of silver per ton.

(*f*) Models of the great ingot moulds employed for forming the pigs of lead of commerce.

(*g*) Model of the great spoon-strainers employed for separating the pure, or nearly pure lead, from the molten liquid.

The operation depends upon the property which lead possesses in weak alloys of crystallizing at a certain temperature, by which means those crystals, at the moment of forming, can be extracted, and thus separated from the silver mass.

By a particular manipulation in transferring the concentrated lead and silver from pot to pot, the mass is at last reduced to an alloy, containing some 80 or 90 ounces silver to the ton of lead, and much beyond which at it is not found advantageous to crystallize.

The rich lead is now simply melted in the refining furnace, on a very large cupel, formed of bone ash, exposing a great surface to the draught of air passing over it. The oxygen of the atmosphere is rapidly imbibed by the lead, which becomes the litharge of commerce. This is raked off as quickly as it forms; and finally, the silver is left perfectly, or very nearly, pure, and run into ingots for the market.

(*g*) Is the litharge or minium thus withdrawn from the melted surface.

Model of the lead vapour-condensing apparatus, at Wanloch Lead-mines, as improved by the exhibitor.

A collection of minerals from the Wanloch Lead-mines, or Lead-hills.

[In all great smelting works of this class, the smoke rising from the furnaces is highly charged with most noxious vapours, containing, besides other poisonous matter, a large quantity of lead; many attempts have been made to obviate this nuisance, and the system adopted by the exhibitor has been found to be very successful.

An oblong building in solid masonry about 30 feet in height, is divided by a partition wall, into two chambers, having a tall chimney or tower adjoining, which communicates with one of the chambers at the bottom. (See drawing.) The smoke from the various furnaces, eight in number, and about 100 yards distance from the condenser, is carried by separate flues into a large chamber, from thence by a larger flue, it enters the first chamber of the condenser at the very bottom, and is forced upwards in a zigzag course towards the top, passing four times through a shower of water constantly percolating from a pierced reservoir at the summit of the tower. The smoke is again compelled to filter a fifth time, through a cube of coke some two feet square, through which a stream of water filters downwards, and which is confined to its proper limits by a vertical grating of wood.

The smoke having reached the top, is now opposite the passage, into the second, or vacuum chamber.

This is termed the exhausting chamber, and is about five feet by seven feet inside, and 30 or more feet in height.

On its summit is fixed a large reservoir, supplied by an ample stream of water, always maintaining a depth of 6 to 10 inches.

The bottom of this tank is of iron, having several openings, or slots, 12 in number, about an inch in width, and extending across the whole area of the reservoir, communicating directly with the chamber beneath.

On this iron plate, works a hydraulic slide-plate, with openings corresponding in one position with those in the reservoir.

This plate receives a horizontal reciprocating motion from a water-wheel or other power, driven by means of a connecting-rod and crank.

In the middle of every stroke, the openings in the plate correspond with those in the bottom of the reservoir, and a powerful body of water falls as a shower bath, the whole height of the vacuum chamber, and in doing so, sweeps the entire inside area, carrying with it every particle of insoluble matter held suspended in the vapours coming from the furnaces.

The atmospheric pressure, of course, acts in alternate strokes as a blast at the furnace-mouths, and causes a draft sufficiently strong to force the impure vapours through the various channels, in connexion with the water, the wet coke and exhausting chamber, until it passes purified and inert into the open atmosphere.

The water, saturated with particles of lead, &c., held in mechanical solution, finally passes into great dykes or reservoirs, excavated for the purpose; and then deposits at leisure, its rich charge of metal.

(*h*) Is the lead collected from this "fume," or deposit, which contains about 33 per cent. of pure lead, and about 4 oz. 17 dwts. and 7 grains of silver to the ton.

(*i*) The condensed fume roasted.

The results of this constructure are most apparent, and beneficial to the surrounding neighbourhood.

Formerly, the noxious fumes passing from the shafts of the furnaces, poisoned the neighbourhood; the heather was burnt up; vegetation destroyed, and no animal could graze, or bird feed near the spot.

Now, the green heather is seen in all its native luxuriance close around the establishment; and the sheep graze within a stone's throw of the chimney's base, and game on all sides take shelter.—J. A. L.]

Blackwell, S. H., *Dudley*.

A series of iron ores, illustrating the general iron-making resources of the United Kingdom.

The gross annual production of iron in Great Britain is now upwards of 2,250,000 tons. Of this quantity South Wales furnishes 700,000 tons; South Staffordshire (including Worcestershire) 600,000 tons; and Scotland 600,000 tons. The remainder is divided amongst the various smaller districts.

One of the principal causes of the advantages possessed by Great Britain in the manufacture of iron, arises from the number and variety of the measures of argillaceous and black-band ironstones which alternate with the beds of coal in almost all its coal-fields; and in consequence of which, the same localities, and, in many instances, the same mineral workings, frequently furnish both the ore and the fuel required to smelt it.

So extensive are the ironstone beds of the coal measures, that they furnish in themselves the greater part of the iron produced in Great Britain; but the iron-making resources of the kingdom are by no means confined to them. The carboniferous, or mountain limestones of Lancashire, Cumberland, Durham, the Forest of Dean, Derbyshire, Somersetshire, and South Wales, all furnish important beds and veins of hæmatite; those of Ulverston, Whitehaven, and the Forest of Dean are the most extensively worked, and seem to be almost exhaustless. The brown hæmatites and white carbonates of Alston Moor and Weardale also exist in such large masses that they must ultimately become of great importance. In the older rocks of Devon and Cornwall are found many important veins of black hæmatite, and in the granite of Dartmoor numerous veins of magnetic oxide and specular iron ore. The new red sandstone furnishes in its lowest measures beds of hæmatitic conglomerate. In the lias and oolites are important beds of argillaceous ironstones, now becoming extensively worked; and the iron ores of the greensand of Sussex, once the seat of a considerable manufacture of iron, will, in all probability, again soon become available, by means of the facilities of railway communication.

In the following classification, the number of the blast furnaces in each district is given, and the ironstones of the coal measures are arranged in the definite order in which they occur in the different coal-fields; so that their position, in reference to the beds of coal alternating with them, is at once seen. The more important of the coal-fields are also subdivided into districts, showing the changes which occur in each, and thus giving a concise view of their general character. The other iron ores are arranged according to the geological formations in which they occur.

The produce of the manufacture of iron in Great Britain in 1750 was only about 30,000 tons; in 1800, it had increased to 180,000 tons; in 1825, to 600,000 tons; in the following year the duties upon the introduction of foreign iron were either removed or rendered nominal, since which the production of iron has nearly quadrupled itself, being now about 2,250,000 tons.

SOUTH WALES.—(Eastern Outcrop.)

General No. —	*No. of Series.* —	—	*Blast Furnaces.*	
			In	Out
		Principal Works:—		
		Cwm Bran . . .	.	1
		Pontypool . .	2	1
		Abersychan . . .	2	4
		Pentwyn	.	3
		Varteg	2	.
		Gelynos	3	.
		Blaenavon	3	2
		23 Furnaces . . .	12	11
			Ft.	In.
1	1	*Soap Vein Mine, Blaenavon.*		
		Soap Vein Coal . .	.	6
		Coal (not named) . .	2	6
2	2	*Black Pins, Bleanavon.*		
		New Vein Coal, or Elled Coal	4	0
		Droidig Coal, or Big Vein .	4	0
		Red Vein Coal . . .	3	3
3	3	*Three Quarter Balls, Blaenavon.*		
		Rock Vein, or Three Quarter Coal	8	0
		Yard Vein Coal . .	2	6
4	4	*Meadow Vein Mine, or Pwllaca, Blaenavon*		
		Meadow Vein Coal . .	8	10
		Old Coal . . .	5	6
5	5	*Spotted Vein Mine, Blaenavon.*		
6, 7	6	*Bottom Vein Mine, Blaenavon.*		

SOUTH WALES.—(North Eastern Outcrop.)

General No. —	*No. of Series.* —	—	*Blast Furnaces.*	
			In	Out
		Principal Works:—		
		Clydach	4	.
		Nant-y-glo	7	1
		Coalbrook Vale . . .	2	3
		Blaina	2	1
		Cwm Celyn	2	1
		Beaufort	7	.
		Ebbw Vale	4	.
		Victoria	2	2
		Sirhowey	5	.
		Tredegar	7	.
		50 Furnaces . . .	42	8
		Strata.	Ft.	In.
13, 14	1	*Soap Vein Mine, Coalbrook Vale.*—Four courses, =7 inches. Average yield about 2,000 tons per acre.		
15	2	*Black Band, Coalbrook Vale.*—One course, not very generally worked: only very local.		
		Soap Vein Coal . .	1	3
16 to 18	3	*Black Pins, Coalbrook Vale.*—Ten irregular courses of nodules in about 15 feet of ground. Yield about 4,500, tons per acre.		
		Elled Coal . . .	3	4
		Big Vein Coal . .	5	6
19, 20	4	*Three-quarter Balls, Coalbrook Vale.*—Worked with three-quarter coal: three courses (two irregular). Yield per acre very variable, averaging about 1,200 tons		
		Three-quarter Coal . .	3	.
		Bwdellog Coal . .	2	10
		Engine Vein Coal . .	3	2
		Yard Coal . . .	3	8
21, 22	5	*Blackband, Nant-y-glo.*—Worked with the Old Coal over which it lies, very local in extent, but of very good quality, and forming an important measure at Beaufort and Nant-y-glo.		
		Old Coal . . .	5	6
23, 24	6	*Spotted Pin, Coalbrook Vale.*—Two courses = 4¼ inches in 4 feet ground. Yield per acre, about 1,200 tons.		
25, 26	7	*Little Pins, Nant-y-glo.*—Two courses = 5 inches in 3 feet ground. Yield per acre, about 1,400 tons.		
27 to 29	8	*Red Vein, Coalbrook Vale.*—Three courses = 6¼ inches. Yield per acre 1,800 tons.		
30	9	*Big Vein, Nant-y-glo.*—Worked with bottom coal. Two courses = 6 inches. Yield per acre, about 1,700 tons.		
		Bottom Coal . . .	1	8

The beds of coal in this division of the coal-field are all bituminous. The principal coals only are given in this section. The ironstones are principally argillaceous, although some important beds of blackband or carbonaceous ironstone exist locally. The total thickness of the coal measures, in this series, from the Soap Vein Mine to the bottom coal is about 150 yards.

SOUTH WALES.—(Northern Outcrop.)

General No.	*No. of Series.*	—	*Blast Furnaces.*	
		PRINCIPAL WORKS:—	In	Out
		Rhymney	8	2
		Dowlais	11	3
		Ivor	3	1
		Penydarren	5	2
		Cytharfa	6	1
		Hirwain	4	.
		Duffryn and Furnace Ycha	8	.
		Ynysfach	4	.
		Aberdare	6	.
		Aberammon	2	1
		Gadlys	3	.
		70 Furnaces	60	10
		Strata.	Ft.	In.
32	1	*Gwrid Mine, Dowlais.*		
33, 34	2	*Soap Vein, Dowlais.*—Three courses = 6 inches, worked with Soap Vein Coal.		
		Soap Vein Coal.		
35, 36	3	*Upper Black Pins, Dowlais.*—Three courses = 4 inches.		
37, 38	4	*Lower Black Pins, Dowlais.*—One course = 3 inches.		
		Yard Coal	3	6
		Upper Four Feet Coal	3	0
		Dowlais Big Coal	8	0
39, 40	5	*Black Pin Soap Vein, Dowlais.*—Five courses = 11 inches. About 17 yards beneath big coal.		
		Ras Las Coal	7	9
41	6	*Brass Vein Mine, Dowlais.*—Two courses = 3¼ inches lying immediately on Brass Vein Coal.		
		Brass Vein Coal	2	0
42, 43	7	*Little Pins, Dowlais.*—Eight courses = 16 inches.		
		Three Coals	3	0
44	8	*Little Vein, Dowlais.*—One course = 5 inches, lying over Little Vein Coal.		
		Little Vein Coal	3	0
45, 46	9	*Big Blue Vein, Dowlais.*—Three courses = 8½ inches, lying 4 feet above Lower Four Feet Coal.		
		Lower Four Feet Coal	9	3
47	10	*Spotted Vein, Dowlais.*—Three courses = 12 inches, in 8 feet ground, lying about 5 yards below Lower Four Feet Coal.		
48, 49	11	*Red Vein, Dowlais.*—Four courses = 11½ inches in 8 feet ground, about 5 yards underneath Spotted Vein.		
50, 51	12	*Little Blue Vein, Dowlais.*—Six courses = 14 inches in about 12 feet ground.		
52, 53	13	*Jenkin Pins, Dowlais.*—Eight courses = 12 inches in about 10 feet ground.		
54, 55	14	*Lumpy Vein, Dowlais*—Three courses = 6½ inches in about 6 feet ground, worked with Lumpy Vein Coal.		
		Lumpy Vein Coal	1	3
56	15	*Top Rosser Mine, Dowlais.*—One course = 5 inches.		
57	16	*Bottom Rosser Mine, Dowlais.* — Three courses = 8 inches in about 5 feet ground.		

Total average thickness of measures from Gwrid Mine to Bottom Rosser Mine about 320 yards. In the last 100 yards of this, there are five workable beds of coal varying from 2 feet to 9 feet thick: and 62 distinct courses of ironstone varying from 1 to 5 inches thick, many of which, however, are necessarily not workable.

SOUTH WALES.—(Central Anticlinal District.)

General No.	*No. of Series.*	—	*Blast Furnaces.*	
		PRINCIPAL WORKS:—	In	Out
		Cwm Avon	4	2
		Oakwood	2	.
		Garth	.	3
		Maesteg	.	3
		Llynvi	4	.
		Neath Abbey	.	2
		20 Furnaces	10	10
		Strata.	Ft.	In.
58	1	*Upper Blackband, Llynvi.*—One course = 20 inches; worked at Llynvi, Maesteg, and Cwm Avon.		
		Albert Seam	1	8
		Victoria Seam	3	0
59	2	*Lower Blackband, Llynvi.*—One course = 12 inches. These beds, about 22 yards apart, are perhaps, for extent of area and general quality, the most important Blackbands yet discovered in the South Wales Coal-Field, although not nearly equal in thickness to the Blackband in the parish of Gellygaer, in the central part of this coal-field.		
		Yard Vein	3	0
		Two and a Half Feet Vein	2	6
		Two Feet Vein	2	0
		Cae David Vein	4	6
60 to 62	3	*Cockshut or Scwd Mine, Llynvi.*		
63, 64	4	*Fire Clay Vein, Llynvi.*		
		Fire Clay Vein	1	4
65 to 67	5	*Yellow Vein, Llynvi* } These three courses of mine lie in about 24 feet of ground, and are worked together in the patches or open works of this district.		
68	6	*Pin Balsog, Llynvi*		
69, 70	7	*Black Pin, Llynvi*		
		Upper Six Feet Coal	6	0
71, 72, 73	8	*Double Pin, Llynvi.*		
		Truro Coal	3	0
		Lower Six Feet Coal	6	0
74	9	*Big Vein, Llynvi* } These three courses lie in about 38 feet of ground, and are worked together in the same way as Nos. 5, 6, and 7, in patches or open works.		
75	10	*Pin Halkin, Llynvi*		
76	11	*Furnace Mine, Llynvi*		
		Furnace Vein Coal	3	0
		Seven Feet Coal	7	0
77	12	*Coal and Mine Seam, Llynvi.*		
		Coal and Mine Vein	2	3
		CWM AVON SERIES.		
		Wernddu Seam	2	0
		Wern Pistyll Seam	1	9
		Tor Mynydd Seam	2	2
		White Seam	4	0
		Jonah Seam	1	2
78	1	*Blackband, Cwm Avon.*—Thickness varies very much, at Cwm Avon about 7 inches, Oakwood 22 inches.		
		Cwm Bir Seam	1	8
		Black Seam	1	6
		Golden Seam	2	2
		Cockshut Seam	1	6
79	2	*Big Mine, Cwm Avon.*—Lies under Upper Cockshut Rock; one course of 12 inches.		
80	3	*Middle Big Mine, Cwm Avon.*—Lies between two Cockshut rocks; one course of 6 inches.		
81	4	*Lower Big Mine, Cwm Avon.*—One course of 4 inches; sometimes worked with New Mine coal, about 2 feet under it.		
		New Mine Vein	2	4
		Balling Seam	2	2
82, 83	5	*Balling Mine, Cwm Avon.*—Two courses.		
		Finery Seam	2	0
84 to 86	6	*Sulphury Mine, Cwm Avon.*—Three courses = 7 inches.		
		Sulphury Seam	2	0
		Four Feet Seam	4	0
87	7	*Cefn Glo Balls, Cwm Avon.*—This corresponds with the Furnace Vein at Llynvi and Maesteg, worked extensively there in patches: 16 inches worked at Cwm Avon by level.		
		Big Seam	9	0
88	8	*Middle Clay Vein, Cwm Avon.*—One course.		
		Clay Seam	1	9
		Coal and Mine Seam	6	0
89, 90	9	*Five Feet Pins, Cwm Avon.*—Two courses.		
		Five Feet Seam	5	0
		Lower Four Feet Seam	4	0
91 to 93	10	*Jack Mine, Cwm Avon.*		

The total thickness of measures from Wernddu Seam to Lower Four Feet Seam is about 800 yards. The beds of coal in this division are all bituminous. Several important beds of coal and various measures of ironstone are known to exist below the Lower Four Feet Seam coal; but the entire extent of the lower beds is not yet proved in this division of the South Wales Coal-field.

SOUTH WALES.—(Western or Anthracite District.)

General No. —	*No. of Series.* —	—	*Blast Furnaces.* In	Out
		PRINCIPAL WORKS :—		
		Venalt	.	2
		Ystalyfera	5	6
		Yniscedwin	3	4
		Banwen	.	2
		Onllwyn or Brin	2	.
		Cwm Ammon	2	.
		Trim Saren	.	3
		Gwendraith	.	3
		Branere	.	2
		34 Furnaces . . .	12	22
		Strata.	Ft.	In.
94, 95	1	*Blackband, Ystalyfera.*—14 inches thick, very local. Yields about 2,750 tons per acre.		
96, 97	2	*Black Pins, Ystalyfera.*—Two courses = 8 inches. Yields about 2,400 tons per acre		
98	3	*Soap Vein, Ystalyfera.*—Three courses = 9 to 10 inches. Yields about 2,750 tons per acre.		
		Soft Vein Coal . . .		
99	4	*Penny Pieces, Ystalyfera.*—Three courses with scattered balls. Yields about 3,600 tons per acre.		
		Penturin Coal . . .	3	0
100	5	*White Pins, Ystalyfera.*—Sometimes called Coedfalda Mine: Four courses about 16 inches in 14 feet ground. Yields about 4,800 tons per acre.		
		White Vein Coal . .	1	6
101, 102	6	*Black Vein Mine, Ystalyfera.*—Two courses = 8 inches. Yields about 2,400 tons per acre.		
		Black Vein Coal . .	4	0
103*a* to 103*k*	7	*Little Vein Mine, Ystalyfera.*—Ten courses in 18 feet ground, got with Little Vein Coal. Yields 7,000 tons per acre. This is the most important measure of ironstone in this district.		
		Little Vein Coal . .	3	0
105	8	*Billets, Ystalyfera.*		
106	9	*Harnlo Mine, Ystalyfera.*—Two courses.		
		Harnlo Coal . . .	2	0
107	10	*Big Vein, Ystalyfera.*—Two courses = 6 inches. Yielding 1,800 tons per acre when worked by level: if worked in patches 16 feet ground, all interspersed with stone.	5	6
		Big Vein Coal . . .	2	0
		Black Vein Coal . .		
108	11	*Brass Vein, Ystalyfera.*—Five courses in 13 feet of ground. Yielding 2,500 tons per acre.		
		Brass Vein Coal . .	4	0
		Three Coal Vein . .	3	0
		Bryalley Vein Coal . .	3	0
109	12	*Little Brass Mine, Yniscedwin.*		
		Little Brass Vein . .	2	0
		Middle Vein Coal . .	2	6
110, 111	13	*Cwm Fil Mine, Yniscedwin.*—Three courses.		
		Lower Vein Coal . .	3	0
112	14	*Little Blue Vein, Yniscedwin.*		
113	15	*Big Blue Vein, Yniscedwin.*		
114	16	*Gnappog Mine, Yniscedwin.*		
115	17	*Pin Mawr Mine, Yniscedwin.*		

The beds of coal in this district are all anthracite. The measures of ironstone extremely numerous and important, but principally worked in patches or open works. All the measures in this series bear the appearance of having been subjected to an extremely high temperature; which has been in all probability the cause of the conversion of its beds of coal into anthracite.

SOUTH WALES.—(Southern Outcrop.)

General No. —	*No. of Series.* —	—	*Blast Furnaces.* In	Ou
		PRINCIPAL WORKS :—		
		Pentyrch	2	.
		Tondu . . .	1	1
		Cefn Cwsc	1	2
		Cefn Cribbwr . . .	.	1
		Dinas	3	.
		11 Furnaces . . .	7	4
			Ft.	In.
		Rock Vein Coal . .	4	0
		Double Vein Coal . .	4	0
		Little Vein Coal . .	3	0
		Bridge Vein Coal . .	1	6
		Lanthern Vein Coal . .	5	0
		Small Bodur Coal . .	5	0
		Great Bodur Vein . .	8	0
		Sooty Vein . . .	5	6
		North Vawr Vein . .	12	0
		South Vawr Vein . .	4	4
		Second Vawr Vein . .	3	0
		Third Vawr Vein . .	5	6
		Slattog Vein . . .	2	0
		Six Feet Vein . . .	6	0
116, 116*a*	1	*Six Feet Ironstone, Cefn Cwsc.* — Four courses = 9 inches.		
		South Nine Feet Coal . .	9	0
117, 117*a*	2	*Nine Feet Balls, Cefn Cwsc.*—Seven courses = 17 inches.		
		Fiery Vein Coal . .	4	0
118, 118*a*	3	*Fiery Vein Ironstone, Cefn Cwsc.* — Six courses = 14 inches.		
		Five Quarter Vein . .	4	6
		Great Gribbur Vein . .	6	0
119	4	*Gribbur Balls, Cefn Cwsc.*—Two courses = 6 inches.		
120	5	*Upper Spotted Vein, Cefn Cwsc.* —Two courses = 4 inches.		
121	6	*Spotted Balls, Cefn Cwsc.*—Two courses = 4 inches.		
122	7	*Middle Spotted Vein, Cefn Cwsc.* — Two courses = 8½ inches.		
123	8	*Lower Spotted Vein, Cefn Cwsc.*—Two courses = 4½ inches.		
124, 124*a*	9	*Variegated Pins, Cefn Cwsc.*—Two courses = 5½ inches.		
125, 125*a*	10	*Yellow Vein and Balls, Cefn Cwsc.*—Two courses = 8 inches.		
126	11	*Upper Red Vein, Cefn Cwsc.*—Two courses = 3 inches.		
126*a*126*b*	12	*Upper Red Vein Balls, Cefn Cwsc.*—Two courses = 6 inches.		
126*c*	13	*Lowest Red Vein, Cefn Cwsc.* — Two courses = 4 inches.		
126*d*	14	*Pin Rhybwr Balls, Cefn Cwse.*—One course = 3 inches.		
126*e*	15	*Black Balls, Cefn Cwsc.*—Two courses = 3 inches.		
126*f*	16	*Double Balls, Cefn Cwsc.*—Two courses = 6 inches.		
126*g*	17	*Black Pins, Cefn Cwsc.*—One course = 3 inches.		
126*h*	18	*Upper Blue Veins, Cefn Cwsc.*—One course = 4 inches.		
126*i*	19	*Blue Vein Balls, Cefn Cwsc.*—Two courses = 4 inches.		
126*j*	20	*Lower Blue Veins, Cefn Cwsc.*—Two courses = 3 inches.		
126*k*	21	*Lumpy Balls, Cefn Cwsc.*—One course = 5 inches.		
126*l*	22	*Pin Garu Balls, Cefn Cwsc.*—Two courses = 8 inches.		
		Small Gribbur Coal	2	9

The iron ore principally used at the Pentyrch works is hæmatite, from the carboniferous limestone on the south of the South Welsh Coal-field. The annual production of iron on the south outcrop is about 25,000 tons.

SOUTH WALES.—(Upper or Red Ash Series.)

126*a* to 126*b*.	..	*Blackband; Jos. Latch, & Co.*—Colfatch Colliery, Gellygaer, Glamorganshire. This Blackband lies in four courses, respectively 22, 6, 8, and 6 inches thick. Total thickness, 3 feet 6 inches. It lies in 6 feet of ground, and yields upwards of 7,000 tons per acre. Its position is very high in the coal measures above the Mynyddis-mwyn Vein of coal.		

The South Wales Coal-field extends over an area of upwards of 800 miles. Both from its extent and the varied character of its numerous beds of coal and iron, it may be considered as the most important of all our coal-fields. The upper measures furnish the best Red Ash coals for household purposes, whilst its lower measures are well adapted for iron-smelting, and for steam coal.

The number of furnaces now in blast is 143, averaging about 100 tons of iron each per week: or a gross annual production of 700,000 tons, and requiring 2,000,000 tons of ironstone, principally furnished from this coal-field. The annual production of coal is estimated at from 5 to 6,000,000 tons.

In 1796, the annual production of iron in South Wales was 34,011 tons, and in 1823, 182,325 tons; since which time the production has been nearly trebled.

In the eastern part of the district the coals are bituminous; as they approach the west they gradually become semi-anthracitic; and in the western district all the coals are anthracitic.

From the great area of this coal-field, and the great variety in character, both of its beds of coal, and its measures of ironstone and blackband, it will, in all probability, long remain the most important iron-making district in the world.

NORTH WALES.

General No.	*No. of Series.*	—	*Blast Furnaces.*	
		PRINCIPAL WORKS:—	In	Out
		Rhuabon	2	1
		Brymbo	1	1
		5 Furnaces . . .	3	2
		Strata.	Ft.	In.
		Three Yard Coal . .	9	0
		Brassey Coal . . .	2	3
127—130	1	*Upper Yard Ironstone, Rhuabon.*—Four irregular courses (No. 1 to No. 4), averaging about 7 inches.		
		Upper Yard Coal . .	2	6
131—133	2	*Red Coal Ironstone Balls, Rhuabon.*		
		Red Coal . . .	1	6
134—137	3	*Stone Coal Ironstone, Rhuabon.*—Four courses (No. 6 to No. 9).		
		Stone Coal . . .	2	9
		Half-yard Coal . .	1	6
138	4	*Two Yard Coal Ironstone, Rhuabon.*		
139	5	*Lower Yard Coal Ironstone, Rhuabon.*		
		Lower Yard Coal . .	3	0
140—145	6	*Wall and Bench Ironstones, Rhuabon.*—6 courses = 12½ inches (No. 12 to No. 17), lying in about 7 feet of ground.		
		Wall and Bench Coals .	3	0
146—160	7	*Llwyaemion Ironstones, Rhuabon.*—15 courses (No. 18 to No. 32), averaging 30 inches, all worked with the coal in three lifts. Will yield 8,000 to 9,000 tons per acre.		
		Llwyaemion Coal . .	1	6

The production of iron in this district is very limited: the coals are principally thin, good but in quality: and the ironstones, although lean, furnish very good iron. The only important works now in blast are the Rhuabon and the Brymbo. The Brymbo series appear by themselves.

SHROPSHIRE.

General No.	*No. of Series.*	—	*Blast Furnaces.*	
		PRINCIPAL WORKS:—	In	Out
		Madeley Wood . . .	3	.
		Madeley Court . . .	2	1
		The Castle	1	1
		Light Moor	2	.
		Horse-hay	2	1
		Lawley	1	.
		Hinkshay	.	2
		Stirchley	4	.
		Dark Lane	.	2
		New Lodge	1	1
		Donnington	3	.
		Sneds Hill	2	.
		Langley	1	1
		Ketley	1	1
		33 Furnaces . . .	23	10

SHROPSHIRE—*continued.*

General No.	*No. of Series.*	—	*Blast Furnaces.*	
		Strata.	Ft.	In.
161	1	*Chance Pennystone, Donnington Wood.*		
		Fungous Coal . . .	3	0
162, 163	2	*Blackstone, Donnington Wood.*		
164, 165	3	*Brick Measure, Donnington Wood.*		
166, 167	4	*Ballstone, Donnington Wood.*		
		Top Coal . . .	5	6
		Three Quarters Coal . .	2	0
		Double Coal . . .	5	10
168, 169	5	*Yellow Stone, Donnington Wood.*		
		Yard Coal . . .	3	0
170, 171	6	*Blue Flats, Donnington Wood.*		
172	7	*White Flats, Donnington Wood.*		
		. . .		
173—17	8	*Main Pennystone, Donnington Wood* (No. 1), *Madeley Court* (No. 2).		
		Sulphur Coal . . .	7	0
		Clunch Coal . . .	3	0
		Two Feet Coal . . .	2	0
		Clod Coal . . .	2	4
		Little Flint Coal .	2	0
176	9	*Crawstone, Madeley Wood.*		
177	10	*Black Flats (position not given).*		

Annual production of iron about 90,000 tons. This field was one of the first important iron-making districts of the kingdom; but from its limited extent, the production of iron in it has remained, for a considerable period, nearly stationary. The quality which it produces is very good. The coal measures of Shropshire were probably once connected with those of South Staffordshire—indeed, of the identity of some of the measures in the two districts there can be little doubt. This is especially evident in the Whitestone and Cakes of the one, and the Pennystone of the other; and a great resemblance between all the measures of the two fields may also be traced, the difference in their thickness, &c., not being greater than might be expected at such distant points, judging from actual changes that are known to occur in some of the South Staffordshire beds, over comparatively a small space of ground.

SOUTH STAFFORDSHIRE.

General No.	*No. of Series.*	—	*Blast Furnaces.*	
			In	Out
		148 Furnaces . . .	105	43
		STRATA.—DUDLEY DISTRICT.	Ft.	In.
		Brooch Coal . . .	2	6
178—179	1	*Brooch Ironstone, Dudley.*		
		Little Coal (not worked.)		
180, 181	2	*Pins Ironstone, Dudley.*		
182, 183	3	*Penny Earth Ironstone, Dudley.*		
184	4	*Ten Foot Stone, Dudley.*		
		Thick Coal . . .	30	0
185—187	5	*Grains Ironstone, Dudley.*		
	6	*Gubbin Ironstone, Dudley.*		
188		*Gubbin.*		
189		*Cannock.*		
190		*Rubble.*		
191		*Brown Stone.*		
		Heathen Coal . . .	3	0
		Bottom Heathen Coal . .	2	6
192, 193	7	*White Ironstone Binds, Dudley.*		
194, 195	8	*White Ironstone, Dudley.*		
196, 197		*White Ironstone, Brockmoor.*		
198, 199	9	*Cakes, or Bluestone, Dudley.*		
		Sulpher Coal . . .	4	6
		New Mine Coal . .	2	6
		Fire Clay Coal . .	2	6
200, 201	10	*Fire Clay Balls, Dudley.*		
		Bottom Coal	2	0

The Dudley Division of the South Staffordshire and Worcestershire Coal-field is principally celebrated for the Ten Yard, or Thick Coal, so named from its being 30 feet thick, and which may well be termed, *par excellence*, "The Thick Coal." This is the largest and most important bed of coal in the kingdom, and is of excellent quality, both for household purposes and for the manufacture of iron. When undisturbed by faults, and of average quality, this bed of coal, with the associated thin coals and ironstones, is worth at least 1,000*l.* per acre. The quality of iron made is very superior. It was in this district that coal was first used in the year 1619, for the purpose of smelting iron.

The Gubbin and White Ironstones are the principal ironstones of this district. The Gubbin measures will average about 1,500 tons per acre ; the White Ironstone varies much both in quantity and richness. It yields from 1,000 to, occasionally, 3,000 tons per acre ; 1,500 tons may be taken as about the average.

		WOLVERHAMPTON DISTRICT.	Ft.	In.
		Sulphur Coal . . .	2	0
		New Mine Coal . .	6	6
		Fire Clay Coal . .	9	0
202, 203	1	*Poor Robin's, Bunker's Hill.*		
204	2	*Fire Clay Balls, Bunker's Hill.*		
205	3	*Rough Hill White, Darlaston.*		
		Bottom Coal . . .	10	0
206, 207	4	*Gubbin and Balls, Bunker's Hill.*		
		Mealy Grey Coal . .	2	3
208, 209	5	*Blue Flats, Bunker's Hill.*		
210, 211	6	*Bristol Diamonds, Darlaston.*		

The space of ground occupied by the above measures from the Sulphur Coal to the Bristol Diamonds is about 90 yards. These measures occupy a position in the general coal series, below the Thick Coal of the Dudley District; and attain in the Wolverhampton Field a much greater thickness and importance than at Dudley, where scarcely any of the above measures of coal and ironstone prove workable. The ironstones are all of extremely good quality, averaging from 30 to 35 per cent. From the low cost at which they are generally raised, the number and variety of the measures both of coal and ironstone contained in so small a space of ground, and the superior quality of the iron produced, the Wolverhampton Division of the South Staffordshire Coal-field may be considered as one of the most important, in proportion to its area, of any of our iron-making districts.

		BENTLEY AND BIRCH HILLS DISTRICT.	
212, 213	1	*Brown Stone, Bloxwich.*—This is the only measure of Blackband in the South Staffordshire Coal-field. It lies underneath the lowest Heathen Coal, in two courses averaging about 12 inches, and does not prove south of Bentley. The other measures of this district do not vary greatly from those of Wolverhampton.	

The annual production of iron in South Staffordshire and Worcestershire is nearly 600,000 tons. It is considered to be the second most important iron-making district in the kingdom, for although the production of pig-iron in Scotland is equal to that of this district, yet it far surpasses Scotland in the manufacture of wrought-iron; whilst the superior quality produced also gives it pre-eminence over that of Wales.

		Coventry and Bedworth Coal Field.	
214, 215	1	*Bedworth Balls, Bedworth.*—Two courses, forming an exceedingly good and important measure of Ironstone, raised extensively for transport to the South Staffordshire Coal-field.	

NORTH STAFFORDSHIRE.

General No. —	*No. of Series.* —	—	*Blast Furnaces.*	
			In	Out
		PRINCIPAL WORKS :—		
		Silverdale	1	4
		Apedale	2	2
		Kidsgrove	3	.
		Goldendale	2	1
		Etruria	3	.
		Longton	2	1
		21 Furnaces . . .	13	8

NORTH STAFFORDSHIRE—*continued.*

General No. —	*No. of Series.* —	—	*Blast Furnaces.*	
		Strata.	Ft.	In.
		Gutter Coal . . .	2	6
		Red Shag Coal. . .	2	0
220	1	*Bassey Mine, Foley Colliery, Longton.*—Four courses; thickness 2 to 3 feet: in some places (as at Apedale) it attains the great thickness of 6 feet.		
		Bassey Mine Coal . .	2	3
		Spincroft Coal . . .	4	0
		Great Row Coal . .	8	0
		Cannel Row Coal . .	5	0
221	2	*Wood's Mine, Foley Colliery, Longton.*—Four courses = 10 inches.		
		Wood's Mine Coal . .	1	0
222	3	*Deep Mine, Foley Colliery, Longton.*—Four courses.		
		Deep Mine Coal . .	3	9
223	4	*Chalky Mine, Foley Colliery, Longton.*—Four courses.		
224	5	*New Mine, Foley Colliery, Longton.*—Two courses.		
		New Mine Coal . .	1	8
225	6	*Hanbury Mine, Foley Colliery, Longton.*—Two courses.		
226	7	*New Ironstone, Foley Colliery, Longton.*—Five courses = 16 inches in 3½ feet of ground.		
		Knowles Coal . . .	6	0
227	8	*Prior's Field Mine, Foley Colliery, Longton.*—Three courses.		
228	9	*Knowles' Mine, Foley Colliery, Longton.*—Four courses = 2 feet 3 inches.		
		Bay Coal . . .	2	6
		Rider Coal . . .	3	0
		Ash Coal . . .	7	0
229	10	*Little Mine, Foley Colliery, Longton.*		
		Little Mine Coal . .	4	6
		Series from Shelton Colliery, Hanley.		
230to236	1 to 7	*Red Shag Ironstone. Gutter Mine. Bassey Mine. Penny Stone. Deep Mine. Chalky Mine. Gubbin Stone.*		
		Series from Apedale, near Newcastle.		
237to249	1 to13	*Blackband Ironstone*—4 to 5 feet thick. *Red Shag*—6 feet thick. *Red Mine*—9 feet thick. *Bassey Mine*—7 feet thick. *Cannel Mine. Black Mine. Rusty Mine. Chalky Mine. Little Mine. New Mine. Brown Mine. Thickband. Gold Mine.*		

These last two series are not numbered according to their position in the coal measures. Many of them belong to the same measures as those of the Foley Colliery, Longton, although named differently.

The North Staffordshire Coal-field, although not of great importance *directly*, as an iron-making district, its annual produce being only about 55,000 tons, is yet of great importance from the amazing extent of ironstone which it contains, and the large quantities sent thence to the South Staffordshire, and the North Welsh iron districts. No other known coal-field contains anything like an equal number and extent of ironstone measures. From the Bassey Mine to the Knowles Mine, a series of measures at the Foley Colliery, Longton, of only 250 yards in thickness, there are nine distinct workable measures of ironstone. At Apedale, the Blackband, Red-shag, Bassey Mine, and Red Mine, ironstones, are respectively 4, 6, 7, and 9 feet thick. In consequence of so large a proportion of the cheapest worked ironstone measures being Blackband or carbonaceous, and also from the inferior quality of its coals, the iron of this district is inferior. The thickness of the coal measures already known, is upwards of 1,100 yards, containing 32 seams of coal, varying in thickness from 5 inches to 8 feet. Of these, there are 14 beds below the Little Mine coal, all of which, excepting one, are from 2 to 7 feet thick.

YORKSHIRE.—(Northern District.)

General No.	No. of Series.	—	Blast Furnaces. In	Blast Furnaces. Out
		PRINCIPAL WORKS:—	In	Out
		Bowling	3	2
		Low Moor	1	2
		New Begin	2	0
		Shelfe	.	1
		Bierley	3	1
		Farnley	1	.
		16 Furnaces . .	10	6
		Strata.	Ft.	In.
	1	*White Bed Mine, Bierley.*—Yield per acre,		
		1,200 tons.		
300		Top Flats.		
301		Low Flats.		
302		White Balls.		
303		Middle Balls.		
304		Low Measure.		
		Coal	.	4
	2	*Black Bed Mine, Low Moor.*		
305		Top Balls.		
306		Flat Stone.		
307		Middle Balls.		
308		Rough Measure.		
309		Low Measure.		
310		Basset Stone.		
		Black Bed Coal . .	2	3
		Better Bed Coal . .	2	0

Annual production of iron about 25,000 tons. The quality of iron made, very superior. The Low Moor and Bowling marks are especially celebrated. The beds of coal in this district are exceedingly thin. The Better Bed Coal is the only one used for iron-making purposes. The White Bed and Black Bed Mines of this district probably correspond with the Thorncliffe White Mine and the Clay Wood Mine of the southern division of this field.

YORKSHIRE.—(Southern District.)

General No.	No. of Series.	—	Blast Furnaces. In	Blast Furnaces. Out
		PRINCIPAL WORKS:—	In	Out
		Worsbro' Dale . . .	.	1
		Elsecar	.	3
		Milton	1	1
		Thorncliffe	1	1
		Chapeltown	1	1
		Holmes	1	1
		Parkgate	1	.
		13 Furnaces . . .	5	8
		Strata.	Ft.	In.
		Low Wood, or Hobbimer Coal	9	6
311	1	*Swallow Wood Mine, Milton.*—Yields about		
312		1,500 tons per acre.		
313		Flats.		
		Balls.		
		Bottom Measure.		
		Swallow Wood Coal . .	4	9
314	2	*Ledgett Mine, Milton.*—Yields 1,800 tons		
315		per acre.		
316		Flats.		
		Balls.		
		Bottom Measure.		
317	3	*Tankersley Mine, Milton.*—Yields 4,000 tons		
318		per acre.		
319		Top Measure.		
		Middles.		
		Bottom Measure.		
		Deep End Coal . .	5	10
320	4	*Thorncliffe, or Old Black Mine, Parkgate.*—		
321		Yields 1,500 tons per acre.		
		Balls.		
		Holing Measure.		
		Parkgate or Manor Coal .	7	6
322	5	*Thorncliffe White Mine, Parkgate.*—Yields		
323*a*		1,500 tons per acre.		
323*b*		Flats.		
		Balls.		
		Holing Measure.		
		Thorncliffe Thin Coal .	3	0
324	6	*Black or Clay Wood Mine, Parkgate.*		
325		Balls.		
326		Brown George.		
		Whetstone.		
		Silkstone Coal . . .	4	0
		Mortomley Coal . .	3	0

Annual production of iron about 20,000 tons. Thickness of measures from the Hobbimer to Mortomley beds of coal, about 430 yards. The entire thickness of the coal series is, however, much more. The measures thin out rapidly towards the north.

DERBYSHIRE.

General No.	No. of Series.	—	Blast Furnaces. In	Blast Furnaces. Out
		PRINCIPAL WORKS:—	In	Out
		Unston	1	.
		Renishaw	1	1
		Staveley	2	2
		Duckmanton	.	1
		Brimington Moor	1	.
		Newbold	1	.
		Wingerworth	1	1
		Clay Cross	1	1
		Morley Park	2	.
		Alfreton	2	1
		Butterley	2	1
		Codnor Park	2	.
		West Hallam	1	1
		Stanton	2	1
		29 Furnaces . . .	19	10
		Strata.	Ft.	In.
		Yard Coal . . .	3	6
327-334	1	*Measure and Balls Rake, Staveley.*—Yield		
		per acre about 2,500 tons.		
		Whetstone; Flampards; White Measure; Cub; Old Bear; First Balls; Flat Balls; Bottom Measure.		
		Main Hard Coal . .	6	0
		Dunsill Coal . . .	4	0
335, 6, 7	2	*Swallow Wood Rake, Stanton.*—Yield per		
		acre 3,000 tons.		
		Tunnel Coal (*not worked*) .	2	6
338	3	*Tan Yard, or Pender Park Rake, Staveley.*		
339		Yield per acre 2,000 tons.		
340		Red Measure.		
		Balls.		
		Cockle.		
341	4	*Ruff, or Cement Rake, Alfreton.*—Yield		
342		per acre 1,800 tons.		
343		Top Measure.		
		Balls.		
		Bottom Measure.		
544	5	*Brown Rake, Butterley.*—Yield per acre		
345		2,500 tons.		
346		Balls.		
		Top Measure.		
		Bottom Measure.		
		Thin Coal (*not worked*).		
347	6	*Black Rake, Butterley.*—Yield per acre		
348		2,000 tons.		
		Top Measure.		
		Bottom Measure.		
		Yard, or Ell Coal . .	3	6
		Main Soft Coal . .	5	0
349*a*349*b*	7	*Poor Rake, Alfreton.*		
350	8	*Blue Rake, Butterley.*—Yield per acre 900		
		tons.		
		Lower Hard Coal . .	4	6
351	9	*Spring, or Ridding's Rake, Alfreton.*		
352	10	*Dog-tooth Rake, Staveley.*—Yield per acre		
353		2,000 tons.		
354		White Measure.		
355		Sugar Plum Measure.		
356		Marble Measure.		
		Balls.		
		Snail Horn.		
		This rake is called Wallis' Rake, at Butterley, south of which it does not prove.		
357	11	*Brown Measure, Clay Cross.*—Yield per		
		acre 800 tons.		
		Furnace Coal . . .	4	6
358	12	*Nodule Rake, Morley Park.*—Yield per acre		
359		1,600 tons.		
		Cinder Measure.		
		Balls.		
		South of Clay Cross the Nodule Rake is known by the name of the Dog-tooth Rake.		
360	13	*Three Quarter Balls, Clay Cross.*		
		Three Quarter Coal . .	2	6
361-373	14	*Black Shale Rake, Staveley.*—Yield per		
		acre from 4 to 8,000 tons.		
		Whetstone; Chitter; Cheeses; Bear; Top Blues; Lower Blues; Old Man; Old Woman; Double Chitter; White Balls; Flampards; Red Measure; Dun; Beams; Roof Measure; Bottom Balls.		

DERBYSHIRE—*continued.*

General No.	*No. of Series.*	—	Ft.	In.
374, 5, 6	15	*Striped Rake, Kirk Hallam.*—Yield per acre 2,500 tons.		
		Clod Coal . . .	5	6
377	16	*Green Close Rake, Morley Park.*—Yield		
378		per acre 1,000 tons.		
		Balls.		
		Bottom Measure.		
		Coal	3	0
	17	*Holly Close Rake, Morley Park.* — Yield per acre 1,200 tons.		
		Balls.		
		Measure.		
379	18	*Black, or Ketland's Rake, Morley Park.*—		
380		Yield per acre 3,000 tons.		
381—383		Three Measures.		
384		Balls.		
385*a*385*b*	19	*Bacon Flitch Rake, Alfreton.*		
386	20	*Yew Tree Rake, Morley Park.*—Yield per acre 1,000 tons.		
		Coal	1	6
		Kilburn Coal . . .	5	0
387-394	21	*Honeycroft Rake, Stanton.*—Yield per acre 6,000 tons.		
		Chitters; Tufty Balls; Barren Beet; Grindstone Measure; Grinder's Wife; Big Balls; Bottom Flats; Brick Measure.		
395–399	22	*Cwilly Rake, Stanton.*—Yield per acre 4,000 tons.		
		Rachell Measure; Chance Balls; Bottom Measure; Chitters; Coal Measure.		
		Furnace Coal . . .	2	3
404–404	23	*Dale Moor Rake, Stanton.*—Yield per acre 3,000 tons.		
		Clunch Balls; Roof Measure Balls; Roof Measure; Over Bottom; Bottom Balls.		

Annual production of iron about 60,000 tons. Average thickness of coal measures, from magnesian limestone to Kilburne, or lowest worked coal, 600 yards. Many of the beds of ironstone lie in such a thickness of measure as only to be workable to advantage by open work or bell-pits. Where these means of working can be adopted, the produce per acre is oftentimes very large; in the Honeycroft Rake it is 6,000 tons per acre; in the Black Shale 8,000 tons.

NORTHUMBERLAND, CUMBERLAND, and DURHAM.

General No.	*No. of Series.*	—	*Blast Furnaces.* In	Out
		PRINCIPAL WORKS:—		
		Walker	2	.
		Tyne	2	.
		Wylam	1	.
		Hareshaw	.	3
		Redesdale	.	3
		Birtley	1	2
		Witton Park	3	1
		Taw Law	2	3
		Consett and Crookhead . .	7	7
		Stanhope	1	.
		38 Furnaces . . .	19	19
			Ft.	In.
405	1	*Blackband, Hadley, Northumberland.*		
406, 407	2	*Blackband, Haydon Bridge.*—This bed probably occupies the position of one of the beds of coal underneath the Great Limestone, and forms an interesting instance of the manner in which thin beds of Coal sometimes change into beds of Blackband Ironstone. It averages, probably, three feet in thickness.		
408—410	3	*Ballstone, Haltwhistle, Northumberland.*		
411, 412	4	*Ballstone, Nent Head, Cumberland.*—These measures (Nos. 3 and 4) lie in the Plate bed over the Great Limestone, and in about 6 yards of ground: they have been worked extensively on some parts of the out-crop. Average yield 30 to 35 per cent.		

NORTHUMBERLAND, CUMBERLAND and DURHAM—*continued.*

General No.	*No. of Series.*	—	Ft.	In.
413	5	*Brown Hæmatite, Kilhope Fell, near Nent Head.* — This bed corresponds with the Fell Top Limestone bed of this district; which in this locality is converted into a bed of Brown Hæmatite, probably owing to its being intersected by a considerable number of small veins carrying iron "riders." It is from 3 to 7 feet thick, and of good quality.		
414, 415	6	*Brown Hæmatite, Nent Head.*—This bed corresponds with the little limestone bed of this district. It is about 7 feet thick, quality very variable.		
416, 417	7	*Brown Hæmatite, Silly Hole Vein, Alston.*		
418	8	*Brown Hæmatite, Manor House Vein, Alston.*		
419	9	*Brown Hæmatite, Nent Vein, Alston.*		
420	10	*Brown Hæmatite, Stanhope, Durham.*		
421	11	*Brown Hæmatite, St. John's Chapel, near Stanhope.*		
422	12	*Carbonate of Iron, Stanhope.*		
423	13	*Carbonate of Iron, Alston.*		

Annual production of iron about 90,000 tons. The iron works of this district are gradually increasing in importance, the cost of fuel being so low as to permit ores to be brought from many different localities. The black bands of Scotland, and of Haydon Bridge, the brown hæmatites, and white carbonates of Alston and Weardale, and the argillaceous ironstones of the lias of Whitby and Middlesborough, are all used for the supply of the iron works of this district.

The *brown hæmatites* deserve especial attention. They are found associated in very large masses, with the lead veins of this district, and occasionally they occur as distinct and regular beds. They contain from 20 to 40 per cent. of iron. Sometimes they exist as "riders" to the vein, sometimes they form its entire mass, and, in this case, they occasionally attain a thickness of 20, 30, and even 50 yards. Their employment for iron-making purposes is only recent, but the supply of ore which they can furnish is almost unlimited, and when some better means of separating the zinc and lead associated with them may have been discovered, they will, doubtless, be found to be of great importance. Remarkable changes sometimes occur in the character of the metalliferous veins of this district; the same vein which at one point bears principally lead ore, changing to a calamine vein, and then again to brown hæmatite.

LANCASHIRE and WEST CUMBERLAND.

General No.	*No. of Series.*	—	*Blast Furnaces.* In	Out
		PRINCIPAL WORKS:—		
		Cleator Iron Company . .	3	0
		3 Furnaces		
			Ft.	In.
424–429	1-6	*Hæmatite, Cleator Iron Ore Co., near Whitehaven.*		
430 431 432	7 8 9	*Hæmatite, Harrison, Ainslie & Co., Ulverstone.*—Clay ore lying close to surface.		

The production of iron in this district is very limited, being confined to the Cleator Works, and one or two small charcoal works in the Ulverstone district. The quality of the latter, charcoal being used for fuel, is very superior, and the produce commands the highest prices, as it combines, with the fluidity of cast-iron, a certain malleability, especially after careful annealing. The iron of the Cleator Works is smelted with coal, and though, in consequence, not equal to the other, is yet of superior quality. The ore, both of the Whitehaven, and the Ulverstone and Furness districts, is raised most extensively for shipment to the iron works of Yorkshire, Staffordshire, and North and South Wales. In quality, these ores may be considered as the finest in this kingdom, and the supplies which these districts are calculated to produce are very great. The large per centage of iron which they contain, from 60 to 65 per cent., and their superior quality also enable them to bear the cost of tr [illegible] hey are becoming every day of greater importance. They are found, both as veins traversing the beds of the mountain limestone formation, transversely to the lines of stratification, and also as beds more or less regular. The former is the general character of the Ulverstone and Furness ores, no clearly defined bed being, as yet, known in that district, whilst at Whitehaven there are two, if not more beds of irregular thickness, but with clearly defined floors and roofs, and oftentimes sub-divided themselves by regular partings. These beds attain a considerable thickness, occasionally 20 or 30 feet. The area over which they extend is not as yet well known; but they have been worked extensively for many years, and the workings upon them are rapidly increasing. They lie beneath and close to the coal measures, which both furnishes the necessary fuel, and also important beds of argillaceous ironstones for admixture.

FOREST OF DEAN.

General No. —	*No. of Series.* —	—	*Blast Furnaces.* In	Out
		PRINCIPAL WORKS:—		
		Cinderford	3	.
		Forest of Dean Company . .	2	.
		5 Furnaces . . .	5	.
			Ft.	In.
433–438	1 6	*Hæmatite.*		

Annual production of iron about 30,000 tons. The ores of the Forest of Dean are Carboniferous, or Mountain Limestone ores, lying beneath the coal measures, which are not here productive in argillaceous ironstones as in the other principal coal-fields of the kingdom. Besides the limestone ore, there is a bed of ore in the Millstone Grit measures; but which is only worked very locally. The limestone ore occupies a regular position in the limestone measures, although in itself exceedingly irregular, assuming rather the character of a series of chambers than a regular bed. These chambers are sometimes of great extent, and contain many thousand tons of ore, which is generally raised at an exceedingly low cost, no timbering or other supports for the roof being required. The supply of ore producible in the Forest of Dean is almost unlimited. The iron made from it is of a red short nature, and especially celebrated for the manufacture of tin plates. Its superior quality always commands a high price. This ore is raised extensively for shipment to the iron works of South Wales. It was worked at a very ancient date either by the Romans or the Britons, as is evident from the remains of old workings along the outcrop of the ore bed. This ore averages from 30 to 40 per cent.

General No. —	*No. of Series.* —	—	Ft.	In
		Geological Formation: Granite and the Older Rocks.		
439	1	*Compact Micaceous Iron Ore, Hennock, Devon.*—Found in lodes varying from 1 to 12 feet wide, bearing east and west. These lodes are in coarse-grained porphyritic granite. The ore is associated with Quartz, Clay, Schorl, and Hornblende. It contains 60 per cent.		
440	2	*Soft Micaceous Iron Ore, Hennock.*—Found associated with No. 1.		
441	3	*Magnetic Oxide, Haytor, Devon.*—Found inter-stratified with a compact Feldspathic and Horblende Slate. It is associated with Asbestos, Actynolite, Garnet, Opal, Quartz, and Clay. It contains 70 per cent.		
442	4	*Compact Brown Iron Ore, Bishopsteignton, Devon.*—Found in irregular masses, in Limestone. It contains 60 per cent.		
443	5	*Compact and Crystallized Brown Iron Ore, Brixham, Devon.*—Found in irregular masses, in Limestone. It contains 55 per cent.		
444	6	*Red Hæmatite, Sheviock, Cornwall.*—Found in lodes in Clay Slate.		
445	7	*Brown Hæmatite, Sheviock, Cornwall.*		

The micaceous iron ores and the magnetic oxides of Dartmoor (Hennock, &c.) are only just beginning to be known. The quality of iron which they produce is of a superior description, and is calculated to make the finest steel. These ores are not at present raised extensively; but will doubtless become more so when their character is better known, and the localities in which they are found more thoroughly explored. They are sent principally to the South Wales Iron District.

General No. —	*No. of Series.* —	—	Ft.	In.
		Geological Formation. Granite and the Older Rocks.		
446 447 448	1 2 3	*Pysolitic Iron Ore, Tremadoc, Cærnarvonshire.*		

These iron ores have at different periods, been worked to a considerable extent for transport to South Wales. They are of inferior quality; but the large masses in which they lie, enable them to be raised at a very trifling expense. They are found at Tremadoc, Pwllheli, Cærnarvon, Island of Anglesea, and many other localities round the North Welsh Coast; and will doubtless at some period, prove of importance, from the great extent to which they are there developed.

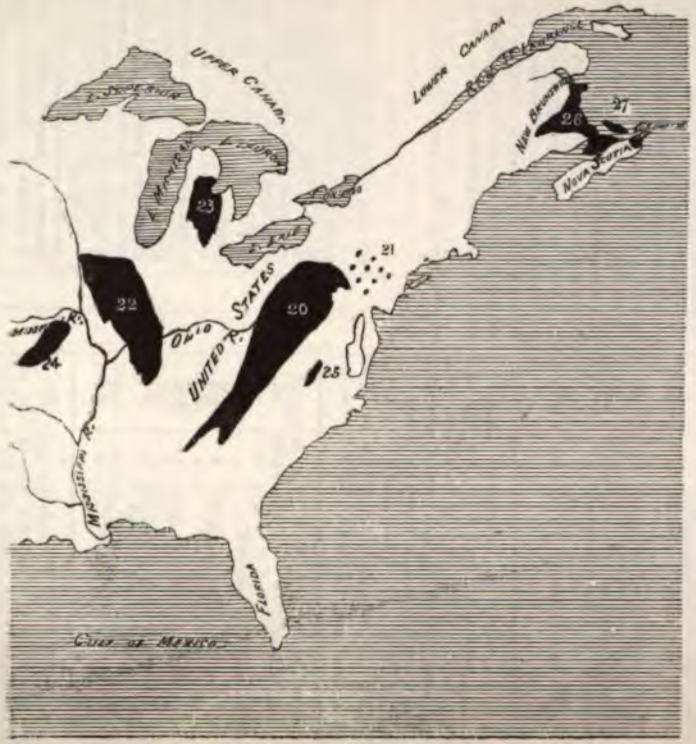
General No. —	*No. of Series.* —	—	Ft.	In.
		Geological Formation. Grauwacke.		
449	1	*Hæmatite, Brendon Hills, Somersetshire.*		
450	2	*Soft Hæmatite, Brendon Hills, Somersetshire.*—Found in lodes varying from 1 to 6 feet in thickness, in Grauwacke and Gray Slate. These lodes are not at present worked extensively; but they form the site of very old and extensive workings, probably by the Ancient Britons.		
		Geological Formation. New Red Sandstone.		
451	1	*Fine Hæmatitic Conglomerate, Newent, Gloucestershire.*		
452	2	*Hæmatitic Conglomerate, Newent, Gloucestershire.*		
453	3	*Hæmatitic Conglomerate, Brockwell, near Wotton, Courtney, Somersetshire.*		
454	4	*Hæmatitic Conglomerate, Brockwell.*		
455	5	*Hæmatitic Conglomerate, Frampton Cotterell, Somersetshire.*		
456	6	*Hæmatitic Conglomerate, Cowbridge, South Wales.*		

These Hæmatitic conglomerates are found at the base of the New Red Sandstone, and generally occupy the position of its lowest bed. Their character as working ores is very variable, being sometimes mixed up with so much extraneous material as almost to be worthless; but occasionally they exist in regular beds, and contain so large a proportion of Hæmatite as to become of considerable importance.

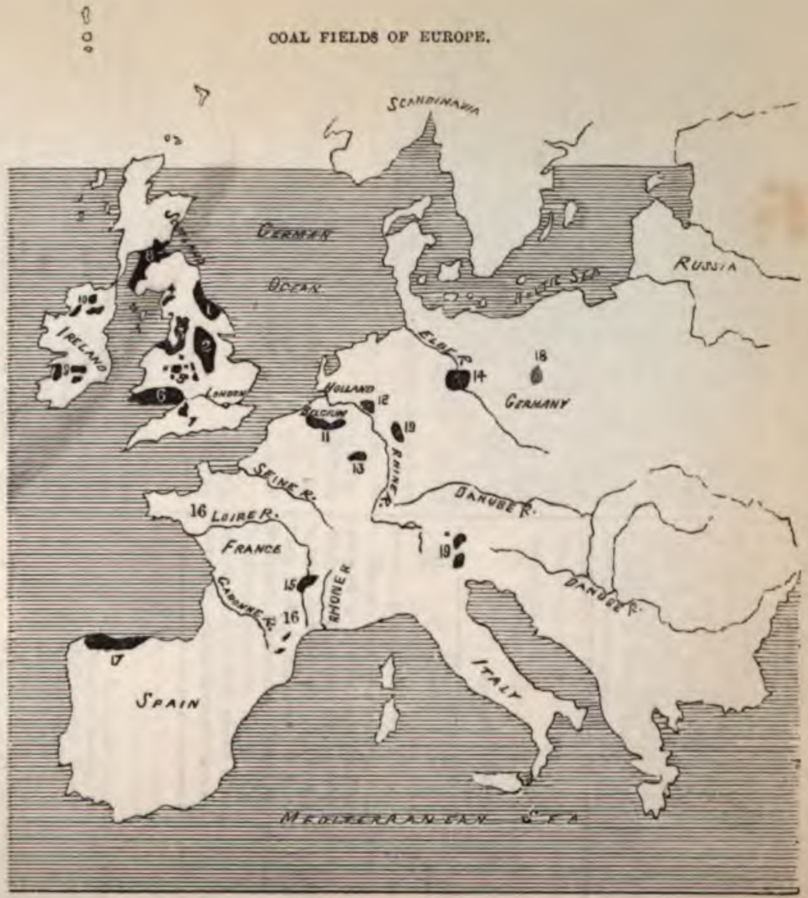
General No. —	*No. of Series.* —	—	Ft.	In.
		Geological Formation. Lias, &c.		
457 458 459	1 2 3	*Ironstone, Whitby.*		
460 461	4 5	*Ironstone, Middlesborough.*		
462	6	*Silicious Ironstone, Saxelby, near Lincoln.*—Bed 2 to 3 feet thick.		
463 464	7 8	*Silicious Ironstone, near Northampton.*		

The clay ironstones of the Lias are only just beginning to add to our iron-making resources. They furnish an instance of the unexpected development of national wealth, arising from the facilities afforded by railroads. Nos. 1, 2, and 3, are raised along the outcrop of the beds along the coast from Whitby to Scarborough. The cost

COAL FIELDS OF THE UNITED STATES AND BRITISH NORTH AMERICA.



COAL FIELDS OF EUROPE.



1. Newcastle Coal Field.
2. Great Yorkshire and Midland Coal Fields.
3. Great Lancashire and North Welsh Coal Fields.
4. Whitehaven Coal Field.
5. Staffordshire, Shropshire, Warwickshire, and Worcestershire Coal Fields.
6. South Welsh Coal Fields.
7. Bristol Coal Fields.
8. Scotch Coal Fields.
9. Irish Anthracitic Coal Fields.
10. Irish Bituminous Coal Fields.
11. Belgian Coal Fields.
12. Ruhr (Prussian) Coal Field.
13. Saare Coal Field.
14. Coal Fields of Bohemia.
15. Coal Field of St. Etienne.
16. Small Coal Fields of France.
17. Coal Field of the Asturias.
18. Coal Field of Silesia.
19. German Brown Coal.
20. Great Alleghany Coal Field.
21. Small Coal Fields of Pennsylvania.
22. Illinois Coal Field.
23. Michigan Coal Field.
24. Missouri Coal Fields.
25. Richmond (Oolitic) Coal Field.
26. Coal Field of New Brunswick.
27. Coal Field of Prince Edward's Island and Cape Breton.

24.

of raising is trifling. Nos. 4 and 5 are from an important bed recently opened at Middlesborough. The thickness of the bed is very irregular, sometimes attaining a thickness of 12 or 14 feet, its average thickness is about 6 feet. Nos. 7 and 8 are from the Oolite, near Northampton. They are at present of no commercial value; but are curious, as showing the almost universal dissemination of this important ore.

General No.	*No. of Series.*	—	Ft.	In.
—	—	*Geological Formation. Green Sand.*		
465	1	} *Ironstone, Sussex.*		
466	2			

These specimens are of great interest, as belonging to the formation which was formerly one of our principal sources of iron; but which, furnishing with its ores no fuel to smelt them, was abandoned, upon the exhaustion of its forests, by the iron trade for the coal-fields, where all the requisites for this manufacture exist. Perhaps, like the lias of Whitby, &c., the Green Sand of Sussex may again, by means of railroads, at no distant period, furnish the iron trade with additional supplies of this important ore.

AN ACCOUNT OF THE NATURE AND EXTENT OF THE VARIOUS DEPOSITS OF MINERAL FUEL IN VARIOUS PARTS OF THE WORLD. Accompanied by a map, showing the extent and position of the principal coal-fields of Europe and North America. By D. T. ANSTED, M.A., F.R.S., &c., Prof. Geol., K.C.L.

1. *General Account of Materials used for Fuel.*

The chief source of supply of valuable fuel is, and always has been, derived immediately or distantly from the vegetable kingdom. Whether in the form of wood, peat, lignite, or coal of various kinds, the original substance of all fuel has been found to have this origin, and thus it would seem that the power of vitality exerted in producing woody fibre has been from time to time stored up, as it were, into vast reservoirs, where it might be preserved safely and permanently for an indefinite period.

In warm climates, where the growth of vegetation is extremely rapid, and comparatively little fuel is needed: or in the early periods of civilization, before men congregate in large masses in towns, or are actively employed in manufacture: there is little need of more fuel than is supplied by the natural growth of forests; but under other circumstances, where forests are gradually removed, and the consumption of fuel at the same time increases, the reserved stores are greatly needed, and must ultimately be reckoned among the main sources of a country's wealth. The accumulations of mineral fuel in the British islands may be ranked as one of those natural advantages, without which our country could not possibly have taken up, and held for a long time the position she occupies among the nations of the earth, and thus, as one of great and principal sources of its mineral treasure, the coal deposits of England demand and deserve our careful attention. The relative supply of other countries, and the activity and energy displayed in taking advantage of the existence of mineral fuel, must also be worthy of attention, as illustrating and explaining the condition of many manufactures, and the probable advance of the inhabitants of such districts in the refinements of civilization. Since the introduction of steam-power for all purposes of machinery, the consumption of coal has very greatly increased, and at present it would be difficult to set any limits to the use of so valuable a material.

The changes undergone by vegetable matter when buried in the earth and accumulated in large quantities, and the length of time needed to produce any marked alteration, are subjects rather interesting, it may seem, to the chemist than to the practical man, who looks only for fuel that he may employ economically. But inasmuch as the real condition of coal varies considerably, and different kinds are valuable for different purposes, it is desirable that the whole history of coal and lignite beds, and of peat and turf, should be generally understood by every one using any or all of these substances extensively.

Vegetable matter consists of particles of carbon with minute proportions of several other elements arranged round minute cavities or cells, many of these being mechanically connected to form the varieties of vegetable fibre. A large quantity of water is also present, and so long as the vegetable lives there is a constant change and circulation of material particles kept up, replacing and renewing the different portions. When death takes place there is a tendency to decomposition, or the separation of the whole into minute atoms, having no further relation to each other. But this is frequently checked by various conditions, such as the presence of some substances derived from plants themselves, or the absence of sufficient oxygen gas to allow the change to take place, by mixing with the carbon, and becoming carbonic acid gas, the first step in the process of destruction. These causes operate constantly, but partially, and thus a large quantity of vegetable matter is always in the course of decomposition, while, in particular spots, a large quantity is constantly being accumulated. The latter condition is seen in our climate in the gradual but steady increase of peat bogs. The former is too common to require further notice.

2. *Peat and Turf.*

Accumulations of vegetable matter may be chiefly composed either of succulent vegetation, grasses, or marsh plants, or of trees, and the structure and condition of woody fibre is well known to be very different from that of grasses and succulent plants. There are thus two very distinct kinds of material preserved, the one undergoing change much less rapidly than the other, and perhaps much less completely. It is easy to prove that, from the accumulation of forest trees has been obtained the imperfect coal called lignite, while from marsh plants and grasses, mixed occasionally with wood, we obtain peat, turf, and bog. All these substances consist to a great extent of carbon, the proportion amounting to from 50 to 60 per cent., and being generally greater in lignite than in turf. On the other hand, the proportion of oxygen gas is generally very much greater in turf than in lignite. The proportion of ash is too variable to be worth recording, but is generally sufficiently large to injure the quality of the fuel.

As a very large quantity of turf exists in Ireland, covering, indeed, as much as one-seventh part of the island, the usual and important practical condition of this substance as fuel can be best illustrated by a reference to that country. This will be understood by the following account of its origin abstracted from the "Bog Report" of Mr. Nimmo. He says, referring to cases where clay spread over gravel has produced a kind of puddle, preventing the escape of the waters of floods or springs, and when muddy pools have thus been formed, that aquatic plants have gradually crept in from the borders of the pool towards their deep centre. Mud accumulated round their roots and stalks, and a spongy semi-fluid was thus formed, well fitted for the growth of moss, which now, especially spears of *Sphagnum*, began to luxuriate; this absorbing a large quantity of water, and continuing to shoot out new plants above, while the old were decaying, rotting, and compressing into a solid substance below, gradually replaced the water by a mass of vegetable matter. In this manner the marsh might be filled up, while the central or moister portion, continuing to excite a more rapid growth of the moss, it would be gradually raise above the edges, until the whole surface had attained elevation sufficient to discharge the surface-water existing channels of drainage, and calculated by its sl to facilitate their passage, when a lin degree, set to its further increase. the bog, or in its immediate vicini favour its growth, though in a here, if the water proceeding fr structed as to accumulate at its base, and to keep it in a rotten fluid state, the surface of the bog might be ultimately so raised, and its continuity below so totally destroyed, as to cause it to flow over the retaining obstacle, and flood the adjacent country.

In mountain districts the progress of the phenomenon is similar. Pools, indeed, cannot in so many instances be formed, the steep slopes facilitating drainage, but the clouds and mists resting on the summits and sides of mountains, amply supply their surface with moisture, which comes, too, in the most favourable form for vegetation, not in a sudden torrent, but unceasingly and gently, drop by drop. The extent of such bogs is also affected by the nature of the rock below them. On quartz they are shallow and small; on any rock yielding by its decomposition a clayey coating, they are considerable; the thickness of the bog (for example in Knocklaid, in the county of Antrim, which is 1,685 feet high) being nearly 12 feet. The summit bogs of high mountains are distinguishable from those of lower levels, by the total absence of large trees.

As turf includes a mass of plants in different stages of decomposition, its aspect and constitution vary very much. Near the surface it is light-coloured, spongy, and contains the vegetable matter but little altered; deeper it is brown, denser, and more decomposed; and finally, at the base of the greater bogs, some of which present a depth of 40 feet, the mass of turf assumes the black colour, and nearly the density of coal, to which also it approximates very much in chemical composition. The amount of ash contained in turf is also variable, and appears to increase in proportion as we descend. Thus, in the section of a bog 40 feet deep, at Timahoe, those portions near the surface contained 1½ per cent. of ashes, the centre portions 3¼ per cent., whilst the lowest four feet of turf, contained 19 per cent. of ashes. In the superficial layers, it may also be remarked, that the composition is nearly the same as that of wood, the vegetable material being but little altered, and in the lower we find the change into coal nearly complete. Notwithstanding these extreme variations, we may yet establish the ordinary constitution of turf with certainty enough for practical use, and, on the average specimens of turf selected from various localities, the following results have been obtained :—

The calorific power of dry turf is about half that of coal; it yields, when ignited with litharge, about fourteen times its weight of lead. This power is, however, immensely diminished in ordinary use, by the water which is allowed to remain in its texture, and of which the spongy character of its mass renders it very difficult to get rid. There is nothing which requires more alteration than the collection and preparation of turf; indeed, for practical purposes, this valuable fuel is absolutely spoiled as it is now prepared in Ireland. It is cut in a wet season of the year; whilst drying it is exposed to the weather; it hence is in reality not dried at all. It is very usual to find the turf of commerce containing one-fourth of its weight of water, although it then feels dry to the hand. But let us examine how that affects its calorific power. One pound of pure dry turf will evaporate 6 lbs. of water; now in 1 lb. of turf, as usually found, there are ¾ lb. of dry turf, and 1¼ lb. of water. The ¾ lb. can only evaporate 4½ lbs. of water; but out of this it must first evaporate the ¼ lb. contained in its mass, and hence the water boiled away by 1 lb. of such turf is reduced to 4¼ lbs. The loss is here 30 per cent., a proportion which makes all the difference between a good fuel and one almost unfit for use. When turf is dried in the air, under cover, it still retains one-tenth of its weight of water, which reduces its calorific power 12 per cent., 1 lb. of such turf evaporating 5¼ lbs. of water. This effect is sufficient, however, for the great majority of objects; the further desiccation is too expensive and too troublesome to be used, except in some especial cases.

The characteristic fault of turf as a fuel is its want of density, which renders it difficult to concentrate within a limited space the quantity of heat necessary for many operations. The manner of heating turf is, indeed, just the opposite to that of anthracite. The turf yields a vast body of volatile inflammable ingredients, which pass into the flues and chimney, and thus distribute the heat of combustion over a great space, whilst in no one point is the heat intense. Hence for all flaming fires turf is applicable, and in its application to boilers it is peculiarly useful, as there is no liability to that burning away of the metal, which may arise from the local intensity of the heat of coke or coal. If it be required, it is quite possible, however, to obtain a very intense heat with turf.

The removal of the porosity and elasticity of turf, so that it may assume the solidity of coal, has been the object of many who have proposed mechanical and other processes for the purpose. It has been found that the elasticity of the turf fibre presents great obstacles to copression, and the black turf, which is not fibrous, is, of itself, sufficiently dense.

Not merely may we utilize turf in its natural condition, or compressed, or impregnated with pitchy matter, but we may carbonize it, as we do wood, and prepare turf charcoal, the properties of which it is important to establish. The methods of carbonization are of two kinds :—1. By heating turf in close vessels; by this mode loss is avoided, but it is expensive, and there is no compensation in the distilled liquors, which do not contain acetic acid in any quantity. The tar is often small in quantity, and the gases are deficient in illuminating power, hence the charcoal is the only valuable product. Its quantity varies from 30 to 40 per cent. by weight of the dry turf. The products of the distillation of 1,157 lbs. of turf were found by Blavier to be—charcoal, 474 lbs., or 41 per cent.; watery liquid, 226 lbs., or 19·3 per cent.; gaseous matter, 450 lbs., or 39 per cent.; and tar, 7 lbs., or 6 per cent.; but the proportion of tar is variable, sometimes reaching to 24·5 per cent. when coked in close vessels.

The economical carbonization of turf is best carried on in heaps, in the same manner as that of wood. The sods must be regularly arranged, and laid as close as possible; they are the better for being large—15 inches long, by 6 broad, and 5 deep. The heaps, built hemispherically, should be smaller in size than the heaps of wood usually are. In general 5,000 or 6,000 large sods may go to a heap, which will thus contain 1,500 cubic feet. The mass must be allowed to heat more than is necessary for wood, and the process requires to be very carefully attended to, from the extreme combustibility of the charcoal. The quantity of charcoal obtained in this mode of carbonization is from 25 to 30 per cent. of the weight of dry turf.

The charcoal so obtained is very light and very inflammable; it possesses nearly the volume of the turf. It usually burns with a light flame, as the volatile matters are not totally expelled. This is shown by the composition of a specimen analyzed with the following result :—

Carbon	89·90
Hydrogen	1·70
Oxygen and nitrogen . .	4·20
Ashes	4·20
	100·00

For many industrial uses the charcoal so prepared is too light, as, generally speaking, it is only with fuels of considerable density that the most intense heat can be produced; but by coking compressed turf, it has been already shown, that the resulting charcoal may attain a density of 1,040, which is far superior to that of wood charcoal, and even equal to that of the best coke made from coal. As to calorific effect, turf charcoal is about the same as coal cokes, and little inferior to wood charcoal.

It is peculiarly important, in the preparation of the charcoal from turf, that the material should be selected as free as possible from earthy impurities, for all such are concentrated in the coke, which may be thereby rendered of little comparative value. Hence the coke from surface turf contains less than 10 per cent. of ash, whilst that of the dense turf of the lower strata contains from 20 to 30 per cent. This latter quantity might altogether unfit it for practical purposes.

The above account of turf and its value, for which we are much indebted to the work of Sir Robert Kane, on the Industrial Resources of Ireland, will be found to apply in an important way to many experiments lately tried with this kind of fuel, and illustrated by several objects exhibited by Mr. Cobbold, Mr. Reece Rees, Mr. J. Rogers, and others. The products obtained for economic use, by the more careful distillation of turf and peat, will be fully described by reference to the body of the catalogue.

3. *Lignite.*

Lignite also occurs in Ireland, especially on the shores of Lough Neagh, where it is partly used as fuel. The vast quantity of the lignite may be judged from a boring at Sandy Bay, described by Mr. Griffith. In 76 feet of depth there occurred three beds of lignite, one of 20, one of 25, and one of 15 feet thick, giving a total thickness of strata of fuel of 60 feet; the remaining 16 feet were clay. Elsewhere, the beds of lignite are not so much developed; but as the area of this tertiary basin extends over 100 square miles, the quantity of fuel therein contained may be considered of much public interest.

This lignite is intermediate between wood and coal, and is found on examination to present all the structure of wood, and is of a deep brown colour. When ignited it gives off gaseous matter, which burns brilliantly, and leaves a dense black charcoal. Specimens are found to contain from 53·7 to 57·7 volatile matter, 30·0 to 33·6 carbon, 8 to 16 ash.

The economic value of the lignite appears from those analyses about two-thirds that of average coal. The heat which it produces is more diffused than that from coal, and less intense. Indeed, in all respects as to application to industrial uses, the position of lignite is between those of coal and wood. The attempts hitherto made to render this fuel available for various economic purposes have not been very successful.

At Bovey Tracy, in Devonshire, and at Brora, in Sutherlandshire, other beds of lignite occur, and have been partially used; and in various oolitic beds in Yorkshire similar mineral fuel exists to a small extent. None of these, as at present worked, present any features of considerable interest. Some beds of bituminous shale at Kimmeridge, Dorsetshire, and elsewhere, have been employed chiefly for local purposes.

But the lignite of Ireland is far inferior, both in extent and calorific power, to that of Germany, where fuel of this kind exists in several places, and to a vast extent. On the banks of the Rhine, in Nassau and its vicinity, and in the east of Europe, in Silesia, and in parts of Styria, deposits of this kind are exceedingly remarkable, and of great economic importance. Their thickness is sometimes enormously great, reaching to 120 feet, and even more, but the beds are generally detached and small, and more resemble drift accumulations than regular deposits. The value of these lignites for the manufacture of iron must ultimately be very considerable, as there exist abundant supplies of iron ore in the immediate vicinity of the fuel, both in Austria and on the Rhine, and also in Silesia.

The lignites of Germany often exhibit distinct woody structure, and can be referred to coniferous trees. They contain a somewhat large per centage of ash, do not form good and compact charcoal, and will not stand the blast of a blacksmith's forge. They are generally so wet as to require some exposure before being used, and when exposed to the air they often crack. In texture they are tough, and sometimes exhibit sufficient remains of their origin as to resist effectually the blow of a hammer, or, if breaking, only parting in the grain of the wood. The change they have undergone has, therefore, been too small to have given them any of the essential characters of true coal, but they still are so far reservoirs of carbon that we cannot doubt of their being ultimately rendered available.

4. *Nature and Distribution of Coal.*

True coal is so much altered from its original vegetable condition as to have left scarcely any traces of its true history. It is generally, however, associated with sands and clays, exhibiting numerous fragments of the ancient vegetation that obtained at the time of its formation; but these fragments are so far removed in every respect with the existing form of vegetation, as to afford little clue to the ancient condition of the earth in this respect. In coal all trace of true woody fibre has disappeared; the water originally present, and so injurious in the less altered forms of vegetable fuel, is entirely absent, or, if present at all, is so rather mechanically than chemically, while the water originally in the plant appears to have undergone decomposition, the hydrogen uniting with some part of the carbon to form carburetted hydrogen gas, often existing in the cells and between the plates of the coal, under considerable pressure, and the oxygen being almost entirely removed. The former vegetable has now become a mineral substance, and lies in vast beds of variable thickness, and overlying each other to the extent sometimes of more than a hundred in a single district; such beds being regularly interstratified with deposits of sand and clay, and occupying a distinct geological position, being, with only a very few exceptions, confined to rocks belonging to the newer part of the palæozoic series.

Between the Arctic Circle and the Tropic of Cancer repose all the principal carboniferous formations of our planet. Some detached coal deposits, it is true, exist above and below those limits, but they appear, so far as we know, to be of limited extent. Many of these southern coal-fields are of doubtful geological age: a few are supposed to approximate to the class of true coals, as they are commonly styled; others are decidedly of the brown coal and tertiary period; while the remainder belong to various intermediate ages, or possess peculiar characters, which render them of doubtful geological origin.

The coals of Melville Island and Byam Martin's Island certainly appear to be of the true coal period. We know that coal exists at numerous intermediate points, from the 75th to the 27th degree of north latitude in America, and also that it is worked on the Sulado and Rio Grande rivers in Mexico, for the use of the steamers.

Southward of the Tropic of Cancer, the existence of coal, corresponding with the European and American hard coal, is somewhat uncertain. There seems to be none on the South American continent, unless it be at Ano Paser, which needs confirmation, or in the province of Santa Catherina, in Brazil. On the African continent we have had vague accounts of coal in Ethiopia and at Mozambique, also at Madagascar; and quite recently we have had intelligence of large quantities of coal in the newly-ceded territory above Port Natal, on the eastern side of Africa; but we believe no geologist has examined those sites. In the Chinese and Burmese empires only brown coal appears to approach the tropic, but true coal seems to exist in the northern provinces. Southward of the Asiatic continent we are uncertain of the exact character of the coal deposits, such as occur abundantly at Sumatra, Java, and Borneo, and neighbouring islands. Coal, however, exists in these islands, and is of fair workable quality.

In New South Wales, the great coal-range on the eastern margin of that continent has sometimes been described as resembling the Newcastle coal in
and sometimes it is described as of more
This coal differs essentially from that of
European formation, but bears a strong
the Burdwan coal of India.

We have not yet arrived at the
pronounce with any
number of coal-basins in
must, however, amount
cipal coal-fields, and many

disturbed position of the strata, into subordinate basins.* These basins or coal districts are, however, grouped into a comparatively small number of districts, and even many of these are little known, and not at all measured. The greater number occur in Western Europe and Eastern North America, while Central and Southern Africa, South America, and a large part of Asia are totally without any trace of true carboniferous rocks. The remarks, therefore, that will follow, chiefly refer to the coal of our own and adjacent countries, or of the United States and British North America.

There are various kinds of coal obtained from mines worked in the true coal-fields, which may be grouped into bituminous coal, steam coal, and anthracite. Of the first the cannel is a remarkable variety, the coarser kinds of it being called in Scotland "parrot," and sometimes splint coal. It contains from 40 to nearly 60 per cent. of volatile matter, and the proportion of carbon varies within the same limits. It burns readily, taking fire like a candle, and giving a bright light, and much smoke. The ash varies from about 4 to 10 per cent. This coal yields on destructive distillation a very large quantity of gas, and is profitably used for that purpose. The gas is not only large in quantity, but remarkably pure, and of excellent quality for purposes of illumination. There is a large quantity of this kind of coal in the Scotch coal-fields, and it has also been found in the Newcastle district, in the Wigan portion of the Lancashire coal-field, and in the Yorkshire and Derbyshire coal-fields. America yields cannel coal in Kentucky, Indiana, Illinois, and Missouri. Cannel coal passes into jet, and may like jet be worked into various ornaments; but it is brittle, and not very hard. The seams are generally rather thin, although there are several important exceptions in which the quantity is very considerable. The coal of Belgium from one basin (that of Mons) seems to be of this kind.

Another and far more abundant kind of bituminous coal is that obtained abundantly in Northumberland and Durham, and commonly used in London and everywhere on the east and south coast of England. This kind is also highly bituminous, burns with much flame, and takes fire readily, but it swells and alters its form while burning, often assuming a striking and very peculiar appearance, illustrated by a column of coke exhibited by Mr. Cory, and also by other cokes shown by the coal trade of Northumberland and Durham. This caking coal, as it is called, yields, on an average of several analyses, about 57 per cent. of carbon, about 37·6 volatile matter, and 5 per cent. ash. Its specific gravity is 1·257, but sometimes higher. It leaves a red ash in an open fire, but requires to be deprived of its volatile matter before being exposed to a strong blast, owing to its tendency to cement together in a solid mass, and prevent a free draft through the grate or furnace in which it is employed. Not only the coals of the Newcastle coal-field in England, but those of France generally, of Bohemia, and Silesia, in Europe, and of Ohio, in North America, are of the caking bituminous kind.

The coals of Staffordshire, Yorkshire and Derbyshire, Lancashire, North Wales, and many other districts, contain nearly or quite as much bituminous and volatile matter as that of Newcastle, but does not cake and swell in the fire, and may, therefore, be employed directly where strong heat is required without previous coking. The coke obtained from this coal is little altered in appearance. The coal burns freely, will flame and give much heat, but is generally considered somewhat inferior for household purposes to that of Newcastle. It yields 50 to 60 per cent. carbon, 35 to 45 volatile matter, and a small quantity, often less than 5 per cent. of ash. The ash is often white. Most of the coals from the inland counties readily show white lines on the edges of the beds, owing to the pressure of argillaceous earth which effloresces. In this respect they are less adapted for general use than the Newcastle coal, but many of them are of excellent quality.

Next in order to the coals of the midland counties generally, are those of some parts of North Wales, and many districts in South Wales, which contain a larger per centage of carbon, very little volatile matter and bitumen, and often but little ash; which burn, however, freely and without smoke, and are well adapted for steam purposes and the manufacture of iron, or where a strong blast and great heat is required. Such coals exist not only in England, but in France, Saxony, and Belgium to some extent. They are often tender or powdery, dirty-looking, and of comparatively loose texture, but they often stand exposure to the weather without alteration or injury. They are called steam coals, and the inferior kinds are known as culm. They contain carbon 81 to 85, volatile matter 11 to 15, ash 3, or thereabouts. Several varieties well known in commerce are exhibited by different proprietors, and the respective analyses will be found in many cases in the body of the Catalogue.

The last kind of coal is that called "Anthracite," and it consists almost exclusively of carbon. This coal is also called non-bituminous, as the steam coal is semi-bituminous. The anthracites contain from 80 to upwards of 95 per cent. carbon, with a little ash, and sometimes a certain small per centage of volatile matter. They are heavier than common coal, take fire with difficulty, but give an intense heat when in full combustion with a strong draught. Anthracite occurs abundantly in the western part of South Wales, in the south of Ireland, in France, Saxony, Russia, and in North America, and the use of them is greatly on the increase. Amongst other things it is used for hop and malt drying, and lime burning with great advantage, but its chief use is in the manufacture of iron. The appearance is often bright, with a shining irregular fracture; the coal is often hard, but some varieties are tender and readily fractured. The ash of anthracitic coal is generally white. As a general rule the anthracites are deficient in hydrogen, but contain a certain proportion of oxygen gas.

The following table represents the weight of water evaporated by one pound each of several principal varieties of coal, and is, therefore,—other things being the same—a good index of the relative value of these fuels:—

	Lbs.	Oz.
Common Scotch bituminous coal .	5	14
Hastings Hartley main, Newcastle .	6	14½
Carr's West Hartley ditto . . .	7	5
Middling Welsh anthracite . . .	7	15¼
Merthyr bituminous coal (South Wales)	8	0
Llangenech steam coal, ditto . .	8	14½
Cameron's steam coal, ditto . .	9	7¾
Pure Welsh anthracite, ditto . .	10	8½

The relative importance of mineral fuel in various countries, as indicated by the actual coal area and the real production of different districts, may be understood by a reference to the subjoined table. This and other statistical facts are based chiefly upon the authority of Mr. Taylor* but have before been given in their present form by the author of the present essay.†

COUNTRIES.	Coal Area in Square Miles.	Proportion of whole Area of the Country.	Annual Production in Tons.
British Islands	12,000	1–10	32,000,000
France	2,000	1-100	4,150,000
Belgium	520	1–22	5,000,000
Spain	4,000	1–52	550,000
Prussia	1,200	1–90	3,500,000
Bohemia	1,000	1–23	
United States of America .	113,000	1–20	4,000,000
British North America . .	18,000	2–9	

It will thus be seen how extremely important the coal-fields of the British islands really are when compared with any others elsewhere. This is the case not merely in the total annual production and the proportionate extent of the deposit, but also in the great number of points at which the coal can be advantageously worked. This will be best seen by reference to another table also here appended.

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* Taylor's "Statistics of Coal," Introduction, p. xxxvii.

* "Statistics of Coal," by R. C. Taylor (London, J. Chapman, 1848).

† "Elementary Course of Geology" (London, 1850, J. Van Voorst).

TABLE of the Principal Coal-Fields of the British Islands.

	Estimated Workable Area in Acres.	Number of Workable Seams.	Estimated Total thickness of Workable Coal in Feet.	Thickest Bed in Feet.	Total thickness of Coal-bearing Measures in Feet.
1. Northumberland and Durham District:—					
Newcastle Coal-Field .	500,000	18	80	7	.
2. Cumberland and Westmoreland, and West Riding of Yorkshire:—					
Whitehaven and Akerton	80,000	7	.	8	2,000
Appleby (three basins) .	17,000	.	.	.	.
Sebergham (Cumberland)	.	1	3	3	.
Kirkby Lonsdale . .	2,500	4	17	9	.
3. Lancashire, Flintshire, and North Staffordshire:—					
Lancashire Coal-Field .	580,000	75	150	10	6,000
Flintshire	120,000	5	39	9	200
Pottery, North Staffordshire.	40,000	24	38	10	.
Cheadle, ditto . . .	10,000	.	.	.	.
4. Yorkshire, Nottinghamshire, Derbyshire, &c.:					
Great Yorkshire Coal-Field	650,000	12	32	10	.
Darley Moor, Derbyshire .	1,500	.	.	.	.
Shirley Moor, ditto . .					
5. Shropshire and Worcestershire:—					
Colebrook Dale, Shropshire.	12,000	17	40	.	.
Shrewsbury, ditto . .	16,000	3	.	.	
Brown Clea hill, ditto .	1,300	3	.	.	
Titterstone, Clea-hill, ditto	5,004		.	.	.
Lickey Hill, Worcestershire.	650		.	.	.
Bewdley, ditto . . .	45,000	.	.	.	.
6. South Staffordshire:—					
Dudley and Wolverhampton.	65,000	11	67	40	1,000
7. Warwickshire and Leicestershire:—					
Nuneaton	40,000	9	30	15	.
Ashby-de-la-Zouch . .	40,000	5	33	21	.
8. Somersetshire and Gloucestershire:—					
Bristol	130,000	50	90	.	.
Forest of Dean . . .	36,000	17	37	.	.
Newent, Gloucestershire .	1,500	4	15	7	.
9. South Welsh Coal-Field .	600,000	30	100	9	12,000
10. Scottish Coal-Fields:—					
Clyde Valley . . .	1,000,000	84	200	13	6,000
Lanarkshire . . .					
South of Scotland, several small areas.					
Mid-Lothian . . .	.	24	94	.	4,400
East Lothian . . .	.	60	180	13	6,000
Kilmarnock . . .	.	3	40	30	.
Ayrshire					
Fifeshire	.	.	.	21	.
Dumfries Coal Region .	45,000	10	55	6	.
11. Irish Coal-Fields:—					
Ulster	500,000	9	40	6	.
Connaught	200,000	.	.	.	.
Leinster, Kilkenny . .	150,000	8	23	.	.
Munster (several) . .	1,000,000	.	.	.	.

The beds with which the coal is generally associated in the British islands are various sands and shales (imperfect slaty beds) of different degrees of hardness; but the actual coal seams themselves often repose directly on clay of peculiar fineness, well adapted for fire-brick, and generally called under-clay. The under-clay is used in many coal districts for various purposes of pottery. Bands of ironstone (impure argillaceous carbonate of iron) are very abundant in certain coal districts, but are almost absent in others. The Scotch coal-fields near Glasgow, the South Welsh, Yorkshire, and some others, are rich in ironstone, which is the chief source of the vast quantities of iron manufactured in this kingdom.

The principal coal areas of Europe, apart from those of the British islands, are those of Belgium, France, Spain (in the Asturias), Germany (on the Ruhr and Saare), Bohemia, Silesia, and Russia (on the Donetz). Of these the Belgian are the most important, and occupy two districts, that of Liége and that of Hainault, the former containing 100,000, and the latter 200,000 acres. In each the number of coal seams is very considerable, but the beds are thin, and so much disturbed as to require special modes of working. The quality of the coal is very various, including one peculiar kind, the Flenu coal, unlike any found in Great Britain, except at Swansea. It burns rapidly with much flame and smoke, not giving out an intense heat, and having a somewhat disagreeable smell. There are nearly fifty seams of this coal in the Mons district. No iron has been found with the coal of Belgium.

The most important coal fields of France are those of the basin of the Loire, and of these, St. Etienne is the best known and largest, comprising about 50,000 acres. In this basin are 18 beds of bituminous coal, and in the immediate neighbourhood several smaller basins, containing anthracite. Other valuable localities are in Alsace, several in Burgundy, much worked by very deep pits, and of considerable extent; some in Auvergne, with coal of various qualities; some in Languedoc and Provence, with good coal; others at Arveyron; others at Limosin; and some in Normandy. Besides these are many others of smaller dimensions and less extent, whose resources have not yet been developed. The total area of coal in France has not been ascertained, but is probably not less than 2,000 square miles. The annual production is now at least 4,000,000 tons.

There are four coal districts in Germany, of the carboniferous period, besides several districts where more modern lignites occur. The principal localities for true coal are near the banks of the Rhine, in Westphalia; on the Saare, a tributary of the Moselle; in Bohemia; and in Silesia. The total annual production exceeds 2,750,000 tons.

Of these various localities, Silesia contains very valuable and extensive deposits of coal, which are as yet but little worked. The quality is chiefly bituminous, the beds few in number, but very thick, amounting in some cases to 20 feet. Some anthracite is found. Bohemia is even more richly provided than Silesia, the coal measures covering a considerable area and occupying several basins. More than 40 seams of coal are worked, and several of these are from four to six feet thick.

The basin of the Saare, a tributary of the Moselle, near the frontier of France, affords a very important and extensive coal-field, which has been a good deal worked, and is capable of great improvement. No less than 103 beds are described, the thickness varying from 18 inches to 15 feet. It is estimated that, at the present rate of extraction, the basin contains a supply for 60,000 years. On the banks of the Ruhr, a small tributary to the Rhine, entering that river near Dusseldorf, there is another small coal-field, estimated to yield annually nearly 1,000,000 tons. The whole annual supply from Prussia and the German States of the Zollverein, or Customs' Union, is considered to exceed 2,750,000 tons.

Hungary and other countries in the east of Europe contain true coal measures of the carboniferous period; but the resources of these districts are not at present developed. On the banks of the Donetz, in Russia, coal is worked to some extent, and is of excellent quality, but it belongs to the older part of the carboniferous period.

Spain contains a large quantity of coal, both bituminous and anthracitic. The richest beds are in the Asturias, and the measures are so much broken and altered in position as to be worked by almost vertical shafts through the beds themselves. In one spot upwards of 11 distinct seams have been worked, the thickest of which is nearly 14 feet thick. The exact area is not known, but it has been estimated by a French engineer that about 12,000,000 of tons might be readily extracted from one property, without touching the portion existing at great depths. In several parts of the province the coal is now worked, and the measures seem to resemble those of the coal districts generally. The whole coal area is said to be the largest in Europe, presenting upwards of 100 workable seams, varying from 3 to 12 feet in thickness.

There are in North America, four principal coal-areas, compared with which, the richest deposits of other countries are comparatively insignificant. These are the great central coal-fields of the Alleghanies; the coal-field of Illinois, and the basin of the Ohio; that of the basin of the Missouri; and those of Nova Scotia, New Brunswick, and Cape Breton. Besides, there are many smaller coal-areas which, in other countries, might well take rank as of vast national importance; and which, even in North America, will one day contribute greatly to the riches of various States.

The Alleghany, or Appalachian coal-field, measures 750 miles in length, with a mean breadth of 85 miles, and traverses eight of the principal states in the American Union. Its whole area is estimated at not less than 65,000 square miles, or upwards of 40,000,000 of acres.

The coal is bituminous, and used for gas. In Kentucky, both bituminous and cannel-coal are worked in seams about three or four feet thick, the cannel being sometimes associated with the bituminous coal as a portion of the same seam; and there are, in addition, valuable bands of iron ore. In Western Virginia there are several coal-seams of variable thickness, one, nine and a half feet, two others, of five, and others, of three or four feet. On the whole, there seems to be at least forty feet of coal distributed in thirteen seams. In the Ohio district, the whole coal-field affords, on an average, at least six feet of coal. The Maryland district is less extensive, but is remarkable as containing the best and most useful coal, which is worked now to some extent at Frostburg. There appears to be about 30 feet of good coal in four seams, besides many others of less importance. The quality is intermediate, between bituminous and anthracitic, and it is considered well adapted to iron making. Lastly, in Pennsylvania, there are generally from two to five workable beds, yielding, on an average, about ten feet of workable coal, and amongst them is one bed traceable for no less than 450 miles, consisting of bituminous coal, its thickness being from twelve to fourteen feet on the south-eastern border, but gradually diminishing to five or six feet. Besides the bituminous coal, there are, in Pennsylvania, the largest anthracitic deposits in the States, occupying as much as 250,000 acres, and divided into three principal districts.

The Illinois coal-field in the plain of the Mississippi is only second in importance to the vast area already described. There are four principal divisions traceable, of which the first, or Indiana district, contains several seams of bituminous coal, distributed over an area of nearly 8,000 square miles. It is of excellent quality for many purposes; one kind burning with much light, and very freely, approaching cannel-coal in some of its properties; other kinds consist of caking, or splint coal. In addition to the Indiana coal-field, there appears to be as much as 48,000 square miles of coal-area in the other divisions of the Illinois district, although these are less known, and not at present much worked. 30,000 square miles are in the state of Illinois, which supplies coal of excellent quality, and with great facility. The coal is generally bituminous.

The third great coal-area of the United States is that of the Missouri, which is little known at present, although certainly of great importance.

British America contains coal in the provinces of New Brunswick and Nova Scotia. The former presents three coal-fields, occupying in all, no less than 5,000 square miles; but the latter is far larger, and exhibits several very distinct localities where coal abounds. The New Brunswick coal-measures include not only shales and sandstones, as is usual with such deposits, but bands of lignite, impregnated with vitreous copper ore, and coated by green carbonate of copper. The coal is generally in thin seams, lying horizontally. It is chiefly, or entirely bituminous.

In Nova Scotia there are three coal-regions, of which the Northern presents a total thickness of no less than 14,570 feet of measures, having 76 seams, whose aggregate magnitude is only 44 feet, the thickest beds being less than four feet. The Pictou, or central district, has a thickness of 7,590 feet of strata, but the coal is far more abundant, one seam measuring nearly 30 feet; and part of the coal being of excellent quality, and adapted for steam purposes. The southern area is of less importance. Besides the Nova Scotia coal-fields, there are three others at Cape Breton, yielding different kinds of coal, of which one—the Sydney coal—is admirably adapted for domestic purposes. There are here 14 seams above three feet thick, one being 11, and one 9 feet.

Coal, existing generally in beds of moderate thickness, inclined at a small angle to the horizon, and often at very considerable depth beneath the surface, is extracted most commonly by the aid of pits or shafts sunk to the bed, and galleries (levels or drifts) cut horizontally, or in the plane of the bed to a certain distance. By a number of such galleries, cut at right angles to each other, the whole bed, within certain limits, is completely laid open, the overlying beds being supported by the masses of coal (pillars or columns) left untouched between the galleries. In this way about one-third of the coal can be extracted, and afterwards, on the supporting columns being also removed, the roof falls in, and the work is regarded as finished. This method is called technically "the pillar and stall method," and is adopted in the Newcastle coal-field. In Yorkshire, and elsewhere, instead of such columns being left, the coal is removed entirely, and at once, without columns; the roof falling behind the work as it advances. This is the long-wall method. Other modes are occasionally followed when the condition of the coal requires it.

Owing to the gaseous substances contained in coal, and given off not only on exposure to heat, but also to a certain extent by pressure, many kinds of coal cannot safely be left during the process of extraction, without some defence from the open lights required by the miner in the mechanical operations of removing the coal from its bed, and conveying it to the pit bottom. An explosive gaseous compound is readily produced by the admixture of the gases given off by the coal, with common air, made to circulate through the workings, and, if neglected, this compound accumulates and travels on till it meets with flame, and then explodes, causing frightful destruction not only to the property of the mine-owner, but also to the life of the miner. Many contrivances have been suggested from time to time; on the one hand, to improve the ventilation of the mines, and on the other, providing means of illumination which would render accidents from explosion less probable, by removing the immediate cause. Examples of both will be found amongst the models and instruments exhibited in this class, and to these the reader is referred. It is not likely that any contrivances can render absolutely safe, an employment which of necessity involves so many, and such serious risks as are connected with coal-mining; but much may, no doubt, be done to diminish the danger both from imperfect ventilation and open light.

In concluding this notice of mineral fuel, it may be worth while to draw attention to the vast and overwhelming importance of the subject, by a reference both to the absolute and relative value of the material, especially in the British Islands. It may be stated as probably within the true limit, if we take the annual produce of the British coal-mines at 35 millions of tons, the value of which is not less than 18,000,000*l.* sterling, estimated at the place of consumption, and therefore including, to a certain amount of transport cost, necessary to render available, the raw material. At the pit mouth the value of the coal is probably about half this, or 9,000,000*l.* sterling, and the capital employed in the coal trade is estimated at 10,000,000*l.* The average annual value of all the gold and silver produced throughout the world has been estimated to have amounted, in 1847, to nearly thirteen millions and three quarters stirling. We have therefore the following summary, which will not be without interest:—

	£
Value of the coal annually raised in Great Britain, estimated at the pit mouth	9,000,000
Mean annual value at the place of consumption	18,000,000
Capital engaged in the coal trade .	10,000,000
Mean annual value of the precious metals obtained from North and South America and Russia . .	5,000,000
Total value of precious metals raised throughout the world in 1847 .	13,710,000
Mean annual value at the furnace, of the iron produced from British coal	8,000,000

SOPWITH, THOS., F.R.S., &c., *Allenheads, Durham*—Producer.

Specimens of Lead Ores and Associated Minerals, with examples of the various stages of progress, from their being excavated in the mine and carried through the several departments of washing and smelting, until furnished and ready for the market in the form of a cake of silver, and a pig, or piece of lead, known as W. B. Lead.

The specimens of minerals usually associated with lead ores are collected from various mines, and are fitted together in a separate case, under the direction of the exhibitor, by Messrs. Cain and Wallace of Nenthead, and others.

The general arrangement of the strata in which these ores and minerals are found, is exhibited by a section of part of the lead-mining district belonging to Wentworth Blackett Beaumont, Esq., at Allenheads, in the county of Northumberland, and from whose mines the specimens of lead ores and examples of processes *during conversion into lead and silver* are taken; and a further illustration of the geological structure of this part of England is given by an isometrical plan and section by the exhibitor, showing a considerable tract of mining ground in the manor of Alston Moor, in the county of Cumberland.

The principal phenomena of mineral veins and displacement of the strata in which lead ore is obtained in the north of England, are shown by dissected models invented by the exhibitor, and examples of the finished products are contained in a separate case, from Mr. Beaumont's smelt-mills, under the direction of his agent, Mr. Thomas Steel.

This collection, the general nature of which is here briefly indicated, is intended to illustrate the geological position and usual products of the north of England lead-mines. The following is the order of the five several portions, and which are more particularly described under these several heads in the sequel:—

I. SECTIONS OF STRATA AT ALLENHEADS AND ALSTON.
II. MODELS TO ILLUSTRATE MINERAL VEINS, ETC.
III. MINERALS ASSOCIATED WITH LEAD ORES.
IV. EXAMPLES OF THE VARIOUS STAGES OF PROGRESS FROM THE MINE TO THE MARKET.
V. LEAD AND SILVER PREPARED FOR SALE.

I. As the express object of this collection is to afford a general view of the whole of the principal features connected with the extensive and important departments of British industry connected with lead-mining, and as this information is more expressly intended for the use of those who are not locally conversant with the physical conditions under which lead ores are usually obtained, the exhibitor has, in the first instance, thought it necessary to present clear and distinct views of the geological structure of the district in which the chief lead-mines of the north of England are situated, in order that, without going into purely technical details, which are only of local interest, the several strata and order of superposition may be readily understood.

As an approximate comparative view of produce, it may be considered that the lead raised in Mr. Beaumont's mines amounts to about one-fourth of the quantity raised in England, about one-sixth of the produce of Great Britain, and about one-tenth of that of the whole of Europe, including the British Isles. They have been extensively worked from time immemorial; part of them are situated in the manors belonging to Mr. Beaumont in the dales of East and West Allen, in the south-west part of Northumberland, and others are situated in the wild district of moors which forms the western extremity of the county of Durham.

This part of the country happens to be at once the centre of the island of Great Britain, and by far the most elevated part of it, which is thickly populated, for, scattered over hills and dales which present an aspect of verdant cultivation, mixed with healthy moors, are to be found some thousands of inhabitants, nearly the whole of them either employed in lead-mines or smelting-mills, or indirectly deriving a livelihood from some connection with lead-mining business. Allenheads forms a central position in the midst of these mines, and the agent's house, shown on the section, is exactly 1,400 feet above the level of the sea, and is the highest house of its magnitude in Great Britain,—nor are many of the cottages of shepherds, and other moorland habitations, of greater elevation.

The datum, or base line of the ALLENHEADS SECTION, is 700 feet above the level of the sea. The drawing, 16¼ feet in length, is on a *true scale* of 100 feet to an inch; by a true scale being meant, that the lengths and heights are projected to the same scale or proportion, so that a true miniature profile of the country is given, as well as a correct reduction of the relative size of the various rocks. The extent of country thus shown is not quite 4 miles, being 3 miles 1,220 yards.

The spectator is supposed to be looking to the north, and the section commences at a point about half a mile eastward from a place called Kilhope Head, which is conspicuously marked in all English maps, inasmuch as the three counties of Northumberland, Durham, and Cumberland all meet in one spot. At about three-quarters of a mile from the point of commencement, the section represents the hill called Kilhope Law; it is on the boundary line of the counties of Northumberland and Durham, and is the highest point of land in the last-named county, being 2,206 feet above the level of the sea. But out of the limits of this section, and about 10 miles south-west from Kilhope Law, the same strata which are here delineated reach an altitude of 2,901 feet above the sea, and this is the highest elevation attained by the rocks which form the carboniferous or mountain limestone of the north of England.

Such being the stratification of the central portion of the narrow part of the island of which the coal-fields of the Tyne and Wear form the extremity on the east, bordering the German Ocean for some distance north and south of Newcastle, while a similar coal-field is found at the western extremity near Whitehaven, it may be observed, with reference to these coal-fields, that they lie over or upon the mountain limestone formation. The coal-beds so extensively worked in the Newcastle and Durham coal-mines, or *collieries*, gradually rise to the west, and one by one *crop out*, or *bassett*, according to the undulations of the country. At length, at about 20 miles west of the German Sea, the lowest of the coal-beds crops out, and from beneath it gradually appear the limestone strata, which continue to rise nearly coincident with the general rise of the country until they reach the summit of Cross Fell (2,901 feet); and this general and very gradual inclination of the strata, a feature of the greatest importance in practical mining, is clearly and accurately delineated in this section.

In a thickness of about 2,000 feet of the alternating beds of sandstone, clay, and limestone, which form the strata of the mining districts of Allendale, Alston, and Weardale, there is one single stratum of limestone called the "great limestone," the veins in which have produced nearly, if not quite, as much ore as all the other strata put together. This stratum is delineated on the section, and may be observed lying at a depth of about 850 feet below the summit of Kilhope Law. Somewhat exceeding 2 miles eastward of this, at Allenheads the top hotching-tub into the box or case of water in which the hotching-tub vibrates.

Case No. 11 is the "smiddum," after being dressed or cleared from all foreign substances in what is locally called a "buddle," and the ore, in being so washed, is said to be "buddled."

Case No. 12. In all operations where a stream of running water is employed to wash lead ores, it is obvious that many of the smaller particles will be carried away with the stream. These particles are allowed to settle by their specific gravity in what are called slime-pits, being merely reservoirs in which the water passes over a long space with a very tranquil movement. In the Case No. 12 is an example of the *slime* or deposit in these slime-pits, undressed.

Case No. 13 contains a specimen of what is called "slime ore," having been extracted or separated from the slime shown in Case No. 12. This separation is effected by manual labour in what are called "*nicking-trunks*," and is made ready for a final washing or separation in the "dolly-tub."

Case No. 14 contains slime ore obtained, not by manual labour, but by means of a patented invention of Mr. Brunton's, by which the slime, being first freely mixed with water, is allowed to fall on a revolving canvas cloth, inclined at a moderate angle, and upon which also drops of water are constantly falling, so as to keep the surface well wetted. The heavier particles of ore being thus free to move, are carried *up* the slightly inclined surface of the canvas, and so pass round a roller to a cistern below, in which they are deposited, while the lighter particles of earthy matter and spar are at once carried *down* the canvas by the stream of water. The ore thus obtained requires finally to be washed in the dolly-tub, after which it is fit for being smelted.

Case No. 15 contains slime ore as taken from the dolly-tub, which is the last operation connected with the washing and dressing of lead ores, as usually practised in the lead-mines belonging to Mr. Beaumont, and in the lead-mines generally of this part of the kingdom.

The German buddle is also occasionally used in dressing slime ores. A considerable improvement was made in this apparatus about 30 years ago by Mr. Robert Stagg, of Middleton, in Teesdale.

Case No. 16 exhibits a specimen of "selected" or superior lead ore, in the form in which it is sent to and deposited at the smelt-mill, ready to be smelted.

Case No. 17 contains an example of the ordinary or common lead ore, as prepared and ready for smelting.

Cases Nos. 18 and 19 contain the same ores (select and common) after having undergone the operation of being "*roasted*," or exposed to a suitable temperature in a reverbatory furnace, the object being to free it from the sulphur contained in galena, pure specimens of which consist of lead 86·6 and sulphur 13·3. By this process the ore is rendered more easily reducible.

Case No. 20. Grey slags formed in the process of ore hearth smelting, and from which the lead is afterwards obtained at the slag hearth.

Case No. 21. Black slags, being the residuum obtained from the slag hearth, and which assume the granulated form from being made to flow, when in a melted state, into water.

Cases Nos. 22 and 23 contain examples of the crystals of selected and common lead, as formed in the process of separating or desilvering the ore: patented by Mr. H. L. Pattinson, and first brought into operation at Mr. Beaumont's smelt-mills.

Cases Nos. 24, 25, and 26, contain specimens of the fume or deposit in the long flues connected with the smelt-mills: that in No. 24 being the ordinary fume collected in the flue, No. 25 the same, after being roasted for the ore hearth, and No. 26 the same, roasted for the slag hearth. The flues or chimneys are built of stone, 8 feet by 6 feet inside, and are upwards of 8½ miles long.

Cases Nos. 27, 28, and 29.—Litharge in the ordinary round state, and two varieties of *Timsed litharge* which has been passed through a sieve.

Case No. 30.—Skimmings from the surface of melted lead, showing iridescent hues, which are frequently of great intensity and beauty.

V. Lead and Silver prepared for Sale.—The following are contained in the large upright case which completes the several objects sent in illustration of lead-mining, viz.:—

No. 31. Lead made from roasted lead ore, and placed in a model-mould same as No. 37.

No. 32. Grey slag lead, in mould.

No. 33. Selected lead, in mould.

No. 34. Common lead, in mould.

No. 35. Lead made from ore-hearth fume, in mould.

No. 36. Lead made from slag-hearth fume, in mould.

No. 37. Empty mould, marked W. Blackett, which name, or its initials, viz., W. B., form the well-known mark of the lead produced from Mr. Beaumont's mines.

No. 38. A pig, or piece of common lead, weighing 12 stones, or 1½ cwt.

No. 39. A pig, or piece of selected lead, weighing 12 stones, or 1½ cwt.

In the above examples, Nos. 31 to 37 are models of reduced size. The dimensions of the ordinary pieces of lead, as manufactured for sale, are shown in Nos. 38 and 39. The number of pieces usually manufactured at these mines in a year, if laid in one continuous line, would extend upwards of 70 miles in length.

No. 40. A cake of silver produced from lead raised in Mr. Beaumont's mines, and weighing 8,000 ounces.

Sect. I. Class 2.

CHEMICAL AND PHARMACEUTICAL PRODUCTS.

Pontifex & Wood, *Shoe Lane, Fleet Street.*

A series of chemical and metallurgic products illustrating the different processes employed for the reduction of lead from its ores, and its subsequent conversion into white lead.

Specimens of various colours and pigments, employed by artists and paper-stainers; crystals of tartaric and citric acid, sulphate of copper, &c.

Andrew, William, & Co., *Tipping Street, Ardwick, near Manchester*—Producer.

Patent velvets, dyed.

Buckley, J., the Trustees of the late, *Manchester*—Manufacturers.

Crystal of copperas, or sulphate of iron.

[This substance is in reality an impure sulphate of iron. The copperas of commerce is obtained by exposing heaps of bi-sulphuret of iron, or iron pyrites, to moisture and air for a considerable period. The elementary constituents of the iron pyrites, sulphur and iron, are oxidized, and a sulphate of the protoxide of iron is obtained, which is washed out and crystallized. It is largely used in the arts for dyeing, ink-making, and also in chemistry and medicine.—R. E.]

Melincrythan Chemical Company, *Neath, Wales*—Manufacturers.

Sugar or acetate of lead.

Wilson, John, *Glasgow*—Manufacturer.

Alum slate, raw, in the condition of bisulphuret of iron and alumina; found resting on the top of the coal in the mines. Three other specimens of the same slate, showing the progressive stages of decomposition.

Sample of the same slate calcined.

Tub of alum in the last stage of manufacture.

Crystals of alum.

Bisulphuret of iron (iron pyrites).

Iron pyrites decomposed.

Sulphate of iron (copperas) obtained from the same ore.

Sulphate of ammonia obtained from ammoniacal water, one of the products of the distillation of coal.

Naphthaline, obtained from naphtha; rare, in consequence of its size and purity.

Spence, Peter, *Pendleton Alum Works, Manchester*—Inventor and Manufacturer.

Iron pyrites.—Bisulphuret of iron, obtained in nodules interspersed in coal; its most general use is to furnish copperas or sulphate of iron by spontaneous decomposition, when spread on the ground, on what are technically called copperas beds.

Refuse pyrites, after being burned for the manufacture of sulphuric acid; used for the patent manufacture of copperas, by digesting it with sulphuric acid diluted.

Copperas crystals.

Sulphate of protoxide of iron, manufactured by patent process.

Schale, or schist, found overlying and underlying all the coal veins, and brought up in immense quantities in nearly all the coal workings, and also in the ironstone mining, the nodules of ironstone being imbedded in the shale. By a patent process, its own weight of alum can be produced, by acting on it with sulphuric acid, &c., one ton of shale, of average quality, yielding one ton of alum.

Shale, calcined for the manufacture of alum.

Shale in the process or manufacture of alum.

Alum of the first and second crystallization.

Alum finished for the market.

Patent zinc cement, or hydraulic mortar.

Specimens of the waste materials from which the cement is manufactured.

Bust composed of the cement.

The cement laid on to wall. Manufactured entirely from refuse matters.

The refuse shale, after the patent alum process, affords the silica and alumina; the refuse lime, after purifying gas for illumination, affords the calcareous ingredient; and the metallic constituent, zinc, is obtained as sulphate of zinc from the refuse of Wicklow pyrites, after its use in the manufacture of sulphuric acid. The cement is hydraulic; the affinity of oxide of zinc for oxygen prevents the oxidization of any iron, and its deleterious effect on vegetation prevents the growth of moss on its surface.

[Iron pyrites may be made to yield at least two valuable chemical products, sulphur, and sulphate of iron, or copperas. The first is obtained by heat, sulphate of iron by simply exposing the iron pyrites, which is a bisulphuret of iron, to the weather. The mass absorbs oxygen from the air, a sulphate of iron is formed, and is washed out and crystallized. The schale or schist employed in the alum manufacture is a slaty clay found both overlying and underlying coal strata, and containing much pyrites.—R. E.]

Tennants, Clow, & Co., *Manchester*—Manufacturers.

Sulphate of copper. Sulphate of zinc. Muriate of tin in crystals. Bichloride of tin. Nitrate of lead. Bichromate of potash. Prussiate of potash. Prussiate (red). Chlorate of potash. Garancine. Stannate of soda. Bisulphate of potash. Soda-ash. Sal-ammoniac; and pink salt.

[The compounds here exhibited furnish a remarkable illustration of the extensive applications of chemistry to modern arts and manufactures. The series exhibited contains many compounds unknown to commerce a few years ago. They are all employed in various processes of either dyeing or calico-printing.—R. E.]

YOUNG, J., *Ardwick Bridge, Manchester*—
Inventor.

Mineral oil. Paraffine. Stannates, with models of apparatus

[This mineral oil occurs as a natural spring in a coal-pit at Riddings, near Alfreton. It is used largely for machinery, the paraffine being very anti-frictional. Paraffine is one of the most remarkable of products, and has received its name from its not having chemical affinity for any substance whatever. It is a result of the distillation of tar-oils.—R. E.]

BUTTON, CHARLES, 146 *Holborn Bars*—
Manufacturer.

Chemical products:—Acids—boracic, chromic, carbazotic, gallic, pyrogallic, metagallic, phosphoric and glacial anhydrous, and uric.

Alum—pure ammonia—chrome—potash—and soda alums.

Ammonia nitrate, benzoate, and oxalate; and binoxalate (impure), remarkable for the size of the crystals.

Arsenic iodide; barium chloride—oxide, and oxide hydrate; barytes nitrate; bismuth chromate and nitrate; cadmium chromate; calcium phosphuret; cerium oxide and oxalate; cobalt acetate, nitrate, phosphate, and chloride; copper protoxide and suboxide; glucina iron sulphuret; lead nitrate, pure; lead chromate, fused; manganese sulphate; mercury nitrate, bichromate, and bicyanide; nickel sulphate; phosphate of soda and ammonia; potash, pure; potash chromate, silicate, and binarseniate; potassium iodide, bromide, and fluoride; silver nitrate; soda, pure; soda, nitrate; strontia nitrate; tin bisulphuret; tungstic acid; tungstate of soda; bitungstate of ammonia; uranium nitrate and oxide; zinc chloride and sulphate, pure; phosphorus; iodine, pure; and bromine, pure.

HAHNEL & ELLIS, 9 *Sugar Lane, Manchester*—
Manufacturers.

Copper and its compounds—Copper ore from the Burra-Burra mine, Australia; sheet, oxide, and sulphate of copper.

Lead and its compounds—Lead ore; protoxide of lead; nitrate of lead.

Tin and its compounds—Tin ore from Cornwall; tin granulated; tin salts, or protochloride of tin; sulphate of soda, or salt cake.

Sulphur—Rough sulphur from Sicily; roll, flowers, crystallized, lac, and black sulphur.

Archill—Orchella weed from Angola; red archill; blue archill; cudbear.

Ammonia—Muriate and sulphate of ammonia.

[Copper, lead, and tin furnish highly important compounds for the use of the dyer and calico-printer. Sulphate of copper, or blue vitriol, nitrate and acetate of lead, and protochloride of tin are the compounds most largely in use for these purposes, and are consumed in quantities altogether enormous in the Lancashire print-works.—R. E.]

KURTZ & SCHMERSAHL, *Cornbrook Works, Manchester*—
Manufacturers.

New colouring matters, and preparations for printing and dyeing in cotton, linen, silk, and wool.

Specimens of printing and dyeing by means of the preparations.

Ultramarine, in different qualities.

[Lapis lazuli is usually found in granite and crystalline limestone. The finely-coloured varieties are employed for vases, in mosaics and furniture, and are much prized. The pigment ultramarine is prepared from the mineral, by slightly igniting it, shaking the mass in water, and, ter reducing it to fine powder, mixing it with a resinous te. *This paste is* then kneaded in cold water, which es *out the ultramarine*, the impurities being retained by the paste. From the costliness of ultramarine its use was formerly confined to the artist; since, however, the discovery by M. Grumet (guided by the analysis of the pigment by MM. Clement and Desormes) of a method of preparing it artificially, its price has become gradually so much reduced as to admit of its very general employment in the arts. For, although M. Grumet kept his process a secret, M. Gmelin and other chemists have published prescriptions for its production, and its manufacture has been of late years much extended, particularly in Germany, though only very recently introduced into England. Ultramarine is a very permanent colour under atmospheric influences, but is decolorized by the presence of acids with liberation of hydro-sulphuric acid, hence, in its employment, the presence of acids should be avoided. Artificial ultramarine may be prepared, according to C. Gmelin, by rapidly igniting a mixture of equal parts of silica, carbonate of soda, and sulphur, first adding a sufficient quantity of a solution of soda to dissolve the silica. The result is a bluish-green mass, which, by ignition in contact with air, becomes blue. Ultramarine consists essentially of silica, alumina, soda, and sulphur; a small quantity of iron appears to be beneficial, but an excess impairs the beauty of the colour.—W. D. L. R.]

HOWARDS & KENT, *Stratford, Essex*—
Manufacturers.

Barks yielding quinine and cinchonine, viz. 1, various descriptions of calisaya bark (*Cinchona calisaya*). 2, Carabaya bark (*Cinchona ovata*). 3, Cusco bark (*Cinchona pubescens*). 4, Carthagena bark (*Cinchona cordifolia*). 5—8, Specimens of red, crown, grey, and loxa barks. 9, Various descriptions of barks used for adulteration. 10, Cinchona Australis. 11, Cascarilla macrocarpa. 12, Cascarilla corua. 13, Cascarilla magnifolia. 14, Buena hexandra. 15, Edostema Peruviana or tacumez bark. 16, Laplacea quinoderma.

Salts of quinine and cinchonine:—Disulphate, sulphate, citrate, hydrochlorate, phosphate, and tartrate.

Nectandra Rodiæi, or green-heart bark, and its alkaloid beberine.

[The tree from which the green-heart bark is obtained belongs to the natural order *Lauraceæ*, a family of plants yielding many powerful and valued medicinal agents. *Nectandra Rodiæi* has been shown by Dr. Maclagan to contain an important alkaloid, called from the native name of the tree (*Bebeeru*) *Beberine*, or *Biberine*. Its effects are comparable to those of quinine. The tree flourishes in Demerara, and its wood is extremely hard.—R. E.]

Refined camphor, with different kinds of rough camphor, &c.:—1, Japan or Dutch camphor. 2, China or Formosa camphor. 3, Borneo or native camphor. 4, Refined camphor. 5, Camphor in the glass in which it was sublimed.

[The tree which yields camphor is *Laurus camphora*. Japan camphor is considered the best, and is imported in tubs into the United Kingdom, but not in large quantities. Crude camphor from China is principally obtained from the island of Formosa, whence its commercial designation. Crude camphor is obtained from the trees yielding it by chopping up the branches and boiling them in water, when the camphor is separated either by cooling or sublimation. It is refined in this country by being re-sublimed.—R. E.]

Refined borax, and articles from which it is made:—1, Commercial boracic acid. 2, Purified boracic acid. 3. Tincal, or natural borax. 4, Artificial tincal. 5, East India refined borax. 6, English refined borax. 7, Modified crystals. 8, Octohedral borax.

[The origin of boracic acid is extremely interesting. Its principal sources are the celebrated lagoons of Tuscany, where it is obtained by a singularly simple and ingenious process. It rises with steam from the heated earth in a region where volcanic tumult is conspicuously manifest, and was formerly avoided by the superstitious peasantry in its vicinity. This steam is condensed by being passed into basins partly filled with water; the boracic acid is held in solution, purified, evaporated, and crystallized. From 10,000 to 12,000 lbs. of this acid are thus obtained every day. Boracic acid is chiefly employed as a source of borax.

Borax consists chemically, when pure, of a biborate of soda. It is, in its impure state, the tincal of commerce, and is obtained in large quanties from a lake in Thibet, on the edges of which it crystallizes, and is collected by the natives. It is also procured from lakes in China and Persia. The greater part of the borax of commerce is obtained from the saturation of boracic acid with soda. Borax is greatly used in the arts as a flux, and for glazing porcelain; also in medicine, and pyrotechny for making "green fire."—R. E.]

Tartaric acid, with specimens of the argols and tartars from which it is made:—1, Argols, various kinds. 2, Tartars, various kinds. 3, Crystallized tartaric acid. 4, The same, in the first stage of manufacture. 5, Powdered tartaric acid.

Citric acid and the articles from which it is made:—1, Concentrated lemon juice. 2, Citrate of lime. 3, Crystallized citric acid. 4, Citric acid, in the first stage of manufacture.

Antimony and preparations:—1, Antimony. 2, Black sulphuret of antimony. 3, Oxysulphuret of antimony. 4, Emetic tartar. 5, Antimonial powder. 6, Kermes mineral.

Silver and preparations:—1, Silver. 2, Lunar caustic. 3, Crystallized nitrate of silver.

[*Nitrate of silver*, commonly called *Lunar caustic*, is a preparation obtained by the solution of metallic silver in nitric acid. Chemical union takes place, and the solution being evaporated and crystallized, a solid nitrate is obtained. This is, for medical purposes, fused and run into moulds. This compound of silver, in a pure state, is of special value as a re-agent to the chemist; it is also extremely useful in the hands of the physician and surgeon. Very pure crystallized nitrate of silver is employed for the production of photographic pictures on paper, glass, and porcelain. When deposited on these surfaces, under peculiar circumstances, it is highly sensitive to the light.—R. E.]

Bismuth and preparations:—1, Bismuth. 2, Oxide of bismuth. 3, Pearl white.

Iron and preparations:—1, Iron. 2, Ammonio chloride of iron. 3, Tartrate of iron. 4, Oxide of iron. 5, Green vitriol. 6, Ammonio citrate of iron. 7, Ammonio tartrate of iron. 8, Citrate of iron and quinine.

Mercury and preparations:—1, Mercury. 2, Oxide of mercury. 3, Binoxide of mercury. 4, Red precipitate. 5, White precipitate. 6, Crude calomel. 7, Crystallized calomel. 8, Calomel. 9, Hydro-calomel, sublimed under water. 10, Corrosive sublimate. 11, Sub-sulphate of mercury.

Magnesia and preparations:—1, Magnesian shale. 2, Magnesian limestone. 3, Epsom salts. 4, Carbonate of magnesia. 5, Calcined magnesia.

[The well-known substance called Epsom Salts is an important preparation of magnesia. It is, in some instances, procured by an ingenious system of employing the residual hydrochloric acid of alkali works, which is made to act upon native magnesian limestone; the lime is dissolved out by the acid, and the residual matter, consisting chiefly of magnesia, is dissolved in sulphuric acid, purified and crystallized. In other cases it is largely obtained by simply acting upon magnesian limestone with dilute sulphuric acid; it is also obtained from the residual salts of sea-water, from which common salt has been separated.—R. E.]

Preparations of potassium:—1, Potashes. 2, Pearlashes. 3, Carbonate of potash. 4, Bicarbonate of potash. 5, Sulphate of potash. 6, Soluble tartar. 7, Commercial saltpetre. 8, Purified nitre.

[The difference in the chemical composition of the potashes and pearlashes of commerce, is, that the one is chiefly a caustic form of the alkali, and the other contains more of the carbonate. Both are alike derived from the combustion of wood. America is the chief source of this alkali at present. Her immense primeval forests, upon which the efforts of man make but little impression, present an inexhaustible source of this valuable alkail. The wood is piled up in a pyramidal heap, and the ashes are collected, partly purified, and fused. Pearlash is prepared from the "black salts," or impure caustic and carbonated alkali, by fusion in an open furnace. Potash is largely employed in medicine and the arts. About 100,000 cwt. are annually imported into Great Britain from America alone.—R. E.]

Preparations of sodium:—1. Soda ash. 2. Subcarbonate of soda. 3. Subcarbonate of soda, absolutely pure. 4. Sesquicarbonate of soda. 5. Bicarbonate of soda. 6. Rochelle salt in the first stage of manufacture. 7. Pure Rochelle salt. 8. Rochelle salt, powdered. 9. Phosphate of soda. 10. Cubic nitre. 11. Purified nitrate of soda. 12. Glauber salts. 13. Hyposulphite of soda.

[The last-named preparation of soda—hyposulphite of soda—is a substance of great importance and peculiar interest to the photographer. It is readily soluble in water, and the solution dissolves, with great facility, the compounds of silver. After a Daguerreotype picture has been taken and developed by mercurial vapour, the coating of iodide and bromide of silver formed on the surface of the plate is instantly dissolved by washing it with this solution. The picture is afterwards dried and gilded. In the Talbotype, hyposulphite of soda is employed to remove the sensitive coating of silver, and thus fix the impressions so as to render them insensible to the further influence of light.—R. E.]

Zinc and its preparations:—1, Zinc. 2, Oxide of zinc. 3, Acetate of zinc. 4, White vitriol.

Iodine and its preparations:—1, Seaweed, yielding iodine. 2, Kelp. 3, Commercial iodine. 4, Resublimed iodine. 5, Hydriodate of potash. 6, Biniodide of mercury.

Opium and its preparations:—1, Opium. 2, Morphia. 3, Acetate of morphia. 4, Muriate of morphia.

[Morphia is a powerful alkaloid, being the active principle of opium.—R. E.]

KING, JOHN, *Glasgow*—Manufacturer. (Sole partner of the Hurlet and Campsie Alum Company.)

Alum slate, or schist, from the mines of Campsie, Stirlingshire, in three different strata, overlying each other in the coal measures.

The same ores in process of decomposition, and in a state of complete decomposition.

The insoluble portion of the decomposed ores mixed with alum schist in its natural state, after having been subjected to combustion.

Muriate of potash, used in the alum manufacture.

Manufactured alum, once twice and thrice crystallized; or finished alum.

DAVIES, JOHN, *Cross Street, King Street, Manchester*—Inventor and Manufacturer.

Preserved size, clear and strong, for any climate; suitable for carvers and builders, bonnet-makers, paper-hangers, and varnishers.

HOPKIN & WILLIAMS, 5 *New Cavendish Street*—Manufacturers.

Pure tannin.

Crystallized chromic acid.

Benzoate of ammonia.

Biniodide of mercury.

Pure aconitine, used in neuralgic affections.

Valerianate of zinc, iron, quinine, bismuth, and of iron and quinine.

Cardole, said to be a new and powerful vesicating agent.

Bromoform, perbromide of formyle, a new anæsthetic agent said to be of greater power than chloroform.

Dutch liquid, chloride of olefiant gas, a new anæsthetic agent, said to be less irritating than chloroform.

Iodoform, periodide of formyle.

Pyrogallic acid, used in photography.

Cyanuret of potassium.

Citrate of iron and quinine.

Sulphate of iron and quinine, a new and powerful tonic.

Arseniate of soda, containing 15 atoms of water.

Kreatine, from the juice of the flesh.

Iodide of iron and quinine.

[Tannin (tannic acid) is obtained from nut-galls, and exists in the bark of all the oak tribe. It is the active agent of the barks used in the art of tanning, forming insoluble compounds with the components of the skins of animals (leather), which it preserves from putrefaction.

Chromic acid is a compound of the metal chromium and oxygen of a fine red colour: it parts readily with half its oxygen, and hence is a powerful oxidizing and bleaching agent. The salts of chromic acid are termed chromates, they are chiefly of a yellow colour; the chromates of Basyta, strontia, and lead are beautiful yellow pigments, much used in distemper and oil painting and printing.

Aconitine is a poisonous vegetable alkaloid, obtained from aconite (wolfstane, monkshood); it is used as a remedy in neuralgia.

Valerianic-acid (valeric acid), is a volatile acid belonging to the same class as acetic acid: it is obtained by oxidizing hydrated oxide of amyle (oil of potato spirit), as acetic acid (vinegar), is obtained by oxidizing hydrated ozide of ethyte (alcohol). It exists ready formed in the aromatic root of the *valeriana officinalis*, from which it is obtained by distillation with water. Valerianates (valerate), are compounds of valerianic acid with bases. Used as a nervous stimulant.

Formyle is a compound of carbon and hydrogen: it bears the same relation to wood spirit (hydrated oxide of methyle), as acetyle does to ordinary alcohol (hydrated oxide of ethyle): it is the radical of formic acid, as acetyle is of acetic acid. Its compounds with iodine and bromine are iodoform and bromoform.

Dutch liquid (oil of the Dutch chemists, olefiant gas), is the hydrochlorate of chloride of acetyle: it is obtained by mixing equal volumes of moist chlorine gas and olefiant gas.—W. D. L. R.]

[Pyrogallic acid is obtained by heating the dried extract of gallnuts, when it is collected by sublimation. In photography it is employed in extremely minute quantities. The pictures comes out without requiring to be developed by a second wash. But the action of this agent is so energetic that it is extremely difficult to anage. A solution of the proto-nitrate of iron pos- ss *similar properties* for the use of the photographer. *E.]*

MASON, CHARLES, & SON, 11 *Munster Street, Regent's Park*—Manufacturers.

Specimens of blacking. French and waterproof varnish.

PICCIOTTO, MOSES HAIM, 8 *Crosby Square*—Inventor and Manufacturer.

Specimens of decolourized and purified gum arabic, obtained by a patent chemical process. When dissolved, it forms a clear mucilage, and may be used for pharmaceutical purposes, for confectionery, for dressing silks, lace, tulle, printing, &c.

Sample of the original gum arabic from which the specimens were prepared.

Specimen of ultra-marine blue, for the first time manufactured in London by Hochstaetter's process.

Pure crystallized mannite, prepared in Italy, and used for medicinal purposes.

[Mannite is obtained from manna, the concrete juice of a species of ash (*Ornus Europæa*), by dissolving in hot alcohol and crystallizing. It is a peculiar variety of sugar.—R. E.]

FAWCETT, BENJAMIN, *late of* 73 *Snow Hill*, and 7 *Sumner Street, Southwark*.

Plain and ornamental specimens in graining or flatting, produced by a kind of paint free from noxious effluvia, and adapted for purposes to which white lead may be applied.

PARROTT, W., 7 *Cleaveland Street*—Producer.

Illustrations in oil and water colour, of an intense and semi-transparent brown colouring substance, derived from the smut of corn.

BROWN, FREDERICK, 12 *Eccleston Place, Pimlico*—Patentee and Manufacturer.

Colours manufactured from the oxide of zinc, applicable for painting in distemper, on porcelain and boards, for paper staining, and for oil-cloth.

The qualities of these paints are stated to be their freedom from noxious properties, their permanency, and economy. They are not acted upon by gases. Specimen board painted with various colours in zinc paint.

STEPHENS, HENRY, 54 *Lower Stamford Street, Blackfriars*—Inventor and Proprietor.

Samples of wood stained by the colour manufactured by the exhibitor, showing how deal or other woods may be ornamented, and the beauty of the natural graining exhibited to the best effect, saving the great expense of painting and graining, by a more speedy and economical process.

SPURGIN, T., *Saffron Walden*—Producer.

Root, stem, flower, and stigmata of saffron.

STURGES, JOSEPH, *Kettering*—Inventor.

Preparation for preserving the turnip plant from the ravages of the fly.

[The turnip-plant often suffers in its earliest growth, from the attacks of a small beetle, called the *Haltica nemorum*, which devours its cotyledon leaves, and thus arrests its further growth. A fine tilth and plenty of good manure generally ensure such a vigorous growth that the plant is enabled to throw out its second pair of leaves before any serious injury has been sustained.—J. W.]

A proposed remedy for the smut in wheat, and also a preventive from the ravages of the slug, grub, and wireworm.

QUELLE, AUGUSTE, *Guy's Court, King Street, Borough, Southwark*—Inventor.

Several specimens of skins, including Russian sable, American sable, baum marten, stone marten, kolinsky, mink, squirrel, musquash, rabbit, bear, and lamb, displaying the different processes of fur dyeing.

BARNES, JAMES BENJAMIN, 143 *New Bond Street*—Manufacturer.

Valerianic acid—produced from the hydrated oxide of amyle, or oil of corn spirit, by oxidation with chromic acid.

Valerianate of potassa and soda—employed in the formation of most of the following salts:—Valerianate of ammonia, baryta, strontia, lime, magnesia, alumina, oxide of chromium, protoxide of nickel and cobalt, and oxide of manganese.

Valerianate of oxide of iron, sesquioxide of iron, and oxide of zinc—employed in medicine as tonics and antispasmodics.

Valerianate of oxide of lead—oxide of silver—suboxide of mercury—oxide of mercury—teroxide of bismuth—oxide of copper—oxide of cadmium—teroxide of antimony—oxide of tin—morphia—quina—cinchonia—strychnia—and oxide of ethyle.

FISHER, JESSE, *Madely, near Shiffnall*—Manufacturer.

1. Bisulphuret of carbon. (C S_2.)
2. Chloride of carbon. (C Cl.)
3. Chloride of sulphur. (S Cl.)
4. Crystals of sulphur; bisulphuret of carbon.
5. Sulphur sublimed from bisulphuret of carbon.

[Bisulphuret of carbon is a remarkable fluid, the extensive application of which is now developing itself. It has the property of dissolving sulphur with great readiness, and that substance can be obtained in a beautifully crystallized state by evaporation of the solvent.—R. E.]

GODSON, SEPTIMUS H., *Tenbury, Worcestershire, and Rutland Gate, London*—Proprietor.

Samples of native mineral waters.

These mineral waters concentrated and tested, to show their mineral constituents.

A phial showing the bromine present in the waters, extracted by ether, and floating in it.

A phial with salts found in the Tenbury mineral water.

SHRUBSOLE, GEORGE WILLIAM, *High Street, Dorking, Surrey*—Producer.

Regular crystals of sulphate of alumina, potassio-tartrate of soda, and sulphate of copper.

FOWLER, JOHN, 35 *Bedford Street, Covent Garden.*

Pure benzoic acid.

DAVY, MACKMURDO, & CO., *Bermondsey*—Manufacturers.

Samples of carbonate of ammonia; corrosive sublimate; calomel; benzoic acid; citric acid; gallic acid; oxalic acid; salt of sorrel; acetate of zinc; nitrate of silver; chloride of barium; nitrate of baryta; tartar emetic crystals; sulphite of soda; nitrate of ammonia; acetate of lead; glycerine; bisulphate of mercury; red precipitate; calomel in powder.

BULLOCK, JOHN LLOYD, 22, *Conduit Street*—Manufacturer.

A series of chemical products derived from substances used as food or medicine.

SPENCER, JOHN ALEXANDER, 9 *Westbourne Place, Hyde Park*—Manufacturer.

Case, containing chemical preparations:—Napthaline (from coal-tar); sulphate of magnesia (Epsom salts); benzoic acid (prepared by sublimation); caffeine (prepared from coffee); hydriodate of quinine; samples of cod-liver oil, 1849-50.

STEVENSON, WILLIAM, *Jarrow Chemical Works, South Shields*—Manufacturer. (2)

Crystals of soda converted into bicarbonate of soda by exposure to carbonic acid gas.

MURRAY, Sir JAMES, M.D., *Monktown, Dublin*—Inventor.

Bi-carbonate of magnesia, dissolved in distilled water; free from impurities. Specimen of fluid camphor and magnesia. Carbonate of magnesia in crystals, a dentrifice.

DICKSON, GEORGE, & CO., 46 *Dundas Street, Edinburgh*—Manufacturers.

Medicinal cod-liver, ling-liver, and skate-liver oils. Used in cases of pulmonary consumption, asthma, lumbago, rheumatism, glandular swellings, and all diseases of a scorbutic or strumous nature.

[Cod liver oil has been long employed in the arts, but its use in medicine is recent. It has been given very extensively within the last two years in a variety of diseases. It appears to be principally efficacious in tuberculous affections, in the treatment of which many other remedies are often employed without success.—R. E.]

Cod liver ointment. Ninety per cent. of the constituents of the oil is contained in this ointment.

OWEN, CHARLES, *Edinburgh*—Manufacturer.

Specimens of pure cod liver oil.

ROBERTSON, W., *Banff, Scotland*—Manufacturer.

Cod-liver oil, manufactured by the exhibitor. Extracted by steam-heat, and rendered almost colourless, without the use of charcoal or any other decolourising agent. Manufactured at the various fishing villages along the coast of the Moray Frith.

Skate-liver oil. Manufactured by the same process. This article is more difficult to obtain. Change of temperature scarcely affects it. By some it is preferred to cod-liver oil.

ROBERTSON, WILLIAM, *Banff.*

Sulphate of baryta and chloride of barium.

[Chloride of barium is a crystalline compound of chlorine and barium, soluble in water. Its solution produces a white insoluble precipitate of sulphate of baryta in sulphuric acid and solutions of sulphate; hence its use as a chemical re-agent for the detection and quantitative determination of sulphuric acid in analysis.

Sulphate of baryta (permanent white), is a compound of sulphuric acid and oxide of barium; artificially prepared, it is extensively used as a pigment for water-colouring, but has not sufficient body to be employed as an oil paint. The native sulphate of baryta is used as an adulterant of white lead paint.—W. D. L. R.]

WATTS, JOHN, 107 *Edgware Rd.*—Manufacturer.

Daphne Mezereum, bark of the root and stem. Daphne Laureola, bark of the root and stem. Cod liver oil, made without water. Oleine of cod liver oil. Tincture of hops, made with home-dried hops; and made with kiln-dried hops. Hydrochlorate of morphia, pure, in crystalline mass.

The following extracts are prepared in open vessels, at a temperature of from 110° to 130° Fahrenheit:—Acetic extract of colchicum, from the fresh corms. Extract of gentian, from the dried root. Pure aqueous extract of aloes, from hepatic aloes. Extract of deadly night-shade, from the flowering plant. Extract of liquorice, from the fresh root. Extract of Turkey rhubarb, from the dried root. Extract of fetid goosefoot, from the flowering plant. Extract of hemlock, from the flowering plant. Elaterium, from the fresh fruit when nearly ripe. Inspissated ox-gall. Extract of henbane, from the flowering biennial plant. Extract of white poppies, from the fresh capsules. Extract of dandelion, from the fresh roots monthly, from October to February. Powdered hemlock, the leaves of the flowering plant. Powdered foxglove, the leaves of the flowering plant.

BURT, STEPHEN JOHN, 26 *Farringdon Street*—
Proprietor.

Cantharides (*Cantharis vesicatoria*), imported from Russia.

Cantharidine, the active principle of the cantharides, alone, and in combination with alkaline and other bases. Cantharidine and potassa. Cantharidine and soda. Cantharidine and lead.

[The *Cantharis vesicatoria* of pharmacy is an insect belonging to the order *Coleoptera*, or beetles. Sicily, Spain, and Astracan are sources of our supply. In the present instance Russia has furnished the insect, and there is a large annual importation from that country. The Russian insects are larger than those of other countries. Cantharidine is obtained from an alcoholic tincture of the powdered insect, and possesses in an intense degree the blistering properties of the powdered cantharides.—R. E.]

WARD, JOHN, *County Donegal, Ramelton.*

Specimens of kelp manufactured from sea-weed.

Iodine, muriate of potash, sulphate of potash, and alkali salt; all manufactured from kelp.

BULLOCK, EDWARD, & CO., *Galway, Ireland.*

Arran kelp, muriate, nitrate, chlorate, and sulphate of potash.

Sulphate of soda, pure sulphur, commercial iodine, pure sublimed iodine, iodide of potash, iodide of lead, biniodide of mercury.

Preparations from sea-weed.

HUSKISSON, J., W., & H., 77 *Swinton Street, Gray's Inn Road*—Manufacturers.

Crystals of the following chemical substances :—

1. Bicarbonate of soda.
2. Rochelle salts unrefined.
3. Rochelle salts, refined.
4. Iodide of potassium.
5. Iodide, ditto, commercial.
6. Iodide of lead.
7. Biniodide of mercury.
8. Iodide purified.
9. Tartaric acid crystals.
10. Citric acid crystals.
11. Acetate of zinc.
12. Sulphate of potash crytals.
13. Purified sulphate of zinc.
14. Phosphate of soda.
15. Sulphate of iron crystals.
16. Carbonate of soda.
17. Purified nitrate of potash.
18. Bicarbonate of potash.

KENT, JAMES HENRY, *Stanton, near Bury St. Edmunds*—Producer.

Dried pharmaceutical indigenous plants, in glass vessels, the lower parts of which exhibit the plants prepared for pharmaceutical purposes, and the upper portions of some of which display the botanical characters of the plants.

Powdered conium, digitalis, and other indigenous pharmaceutical plants.

Dried roots of indigenous pharmaceutical plants.

Dried immature poppyheads, and extract made from the same.

Specimens of pharmaceutical extracts, prepared from indigenous plants.

AUSTIN, JAMES B., *Banbury*—Manufacturer.

Decoctions and infusions of medical substances. Superphosphate of lime. Sulphate of lime or gypsum. Fine white sand, found at Todmarton, near Banbury.

BASS, JAMES, 81 (*late* 78) *Hatton Garden*—
Inventor.

cimens of concentrated medicinal infusions and ons, *intended to obviate* the inconveniences con- *with infusions and decoctions* as usually prepared.

[The infusions of medicinal substances prepared in the ordinary way are extremely liable to decomposition, and soon become covered with fungi. The concentration of such infusions in a form in which they can be preserved for some time is consequently of importance. The preparations are used medicinally by dilution with water; the infusions in their concentrated form preserving a degree of strength above that which it is advisable to adopt for medicines in their administration.—R. E.]

DEVENPORT, JOHN THISTLEWOOD, 33 *Great Russell Street, Bloomsbury.*

Iodide of iron, saccharated 50 per cent. in brilliant lamellæ, neutral and soluble, remains unaltered by the air; iodide of quinine in a neutral crystalline form; iodide of quinine and iron, in the form of syrup; iodide of iron, in the form of syrup; iodide of lead, crystals. Chloride of lead, crystals. Citrate of protoxide of iron, powder. Ammonia, citrate of protoxide of iron lamellæ. Citrate of sesquioxide of iron in lamellæ. Ammonio-citrate of sesquioxide of iron (lamellæ). Quinine, neutral sulphate, crystals, soluble. Citrate of quinine and iron, neutral soluble. Phosphate of iron, soluble lamellæ; phosphate of quinine and iron, soluble lamellæ. Benzoic acid, crystals. Caffeine, crystals. Hydrochlorate of morphia, crystals. Collodion, liquid plaster. Nitrate of silver, crystals. Fluid extract of dandelion, prepared by spontaneous inspissation of the pure juice. Solution of bimeconate of opium entirely free from narcotine. Preparations of cotyledon umbilicus.

[Collodion is a remarkable fluid prepared by dissolving gun cotton in rectified ether. It is used in surgery. Cotyledon umbilicus has lately been used as a remedy for epilepsy. Its employment has been attended in several instances with success.—R. E.]

DUNCAN, FLOCKHART, & CO., *Edinburgh*—
Manufacturers.

Chloroform.

[The inestimable results which have attended the introduction of the anæsthetic or painless mode of operating in surgery, renders the principal medical product employed highly interesting. For this purpose it is inhaled from various forms of apparatus, and the inhalation is continued at intervals during the period of operation. Chloroform is obtained by distilling alcohol with a solution of chloride of lime. Its peculiar fruity odour has also rendered it available for the production of artificial fruit essences.—R. E.]

MACFARLAN, JOHN, FLETCHER, & CO., 17 *North Bridge, Edinburgh*—Manufacturers.

Series illustrative of the manufacture of the salts of morphia, embracing opium, impure muriate of morphia, pure muriate, and sulphate of morphia.

Specimens of gallic acids, embracing galls; tannin, impure and pure; gallic acid, impure; commercial, pure.

Specimens of sulphate of beberine, from green-heart bark, embracing the bark, and impure and commercial sulphate.

[Green-heart bark is yielded by the *Bebeeru* tree of Guiana. Its active principle, beberine, is employed in the form of sulphate, as a febrifuge tonic.—R. E.]

MCCULLOCH, CHARLES, *Covent Garden Market.*

English and American herbs and roots.

MORSON, THOMAS, N. R. & SON, 19 *Southampton Row*—Manufacturer.

Vegeto-alkaloids and their salts, with other chemical preparations employed as medicines.

[To the chemist the preparations known as alkaloids, or vegeto-alkaloids, present many features of peculiar interest. They are also of the highest medicinal importance, acting, as many of them do, with extraordinary power over the animal economy, and supplying to the physician remedies of such energetic action as to enable him, in many cases, to reduce the bulk of medicine from an inconvenient and uncertain, to a convenient form, The crystallization of the vegeto-alkaloids is peculiarly beautiful, and their chemical constitution is extremely complicated. Morphia, quina, strychnia, and brucia, are among these peculiar products, and possess intense medicinal energies.—R. E.]

SMITH, T. & H., 21 *Duke Street, Edinburgh*—Inventors and Manufacturers.

Specimens of aloine, the cathartic principle of the aloes, discovered 1850; of gallic acid, in crystals; of crystallized mannite, extracted from dandelion root; of crystallized mannite, extracted from monkshood root, discovered 1850; and of cantharidine, in crystals, the blistering principle of the Spanish fly, one part being equal to 400 parts of the powder of Spanish flies.

SQUIRE, PETER, 277 *Oxford Street*—Inventor and Manufacturer.

A variety of pharmaceutical extracts and preserved juices of medicinal plants. Liquor of taraxacum (dandelion). Solution of bimeconate of morphia. Fluid extract of Jamaica sarsaparilla. Cod-liver oil. Red rose leaves (dried without heat). Fine crystals of red ferro-prussiate of potash. Large perfect crystals of yellow ferro-prussiate of potash.

[Pharmaceutical extracts were, for a considerable period, the most fallacious of all medicinal preparations. The high temperature to which they were subjected in the manufacture destroyed the active principle sought to be concentrated. Of late they have been prepared, in some instances, by evaporation in the cold; a current of air being driven over the surface of the liquid. They are also safely obtainable by using an apparatus similar to that employed in the sugar manufacture.—R. E.]

A chloroform and ether inhaler. An apparatus for preparing infusions.

TUSTIAN & USHER, *Melcombe, near Banbury*—Manufacturers.

English rhubarb, trimmed and untrimmed, and in powder.

[Many attempts have been made to cultivate in Europe the rhubarb plant for the sake of its medicinal roots. In France, more especially, a place called Rheumpoli has been the scene of a great experiment in this culture; and in the like manner Banbury, in Oxfordshire, has long been celebrated in the source of English supply. All these European rhubarbs have been found very inferior to that imported from Asia, the natural country of the drug.—J. L.]

WILDSMITH, JAMES H. S., *Primrose Street, Bishopsgate*—Manufacturer.

Preparations of the pure alkaloids used in medicine. Pharmaceutical preparations. Chemical preparations of substances used in chemical research and analysis. Specimens of rare crystallizations.

LAMPLOUGH, HENRY, 88 *Snow Hill*– Inventor and Proprietor.

Residual salts from the destructive decomposition of animal substances. Specimens of chlorophospate of soda and potash; of effervescing salts; of crystals of prussiate of potash; and of sulphate of iron.

Specimen of Prussian blue.

BELL & CO., 2, *Wellington Street, Goswell Street.*

Mineral paints, which quickly dry under water, and on metals exposed to extreme heat. They are suitable for ships' bottoms or for damp walls.

COPPOCK, JOHN, *Bridport*—Inventor.

A chemical liquid for imparting the colour of mahogany and rosewood to common woods. A specimen of the prepared wood, polished, with a bottle containing the liquid; the sides of the block are left unstained, to show he natural wood.

[The liquid commonly employed for staining wood so as to communicate to it the appearance of antiquity is a caustic solution of potash. The same effect is also produced by the use of soap leys, simply in consequence of the free alkali contained in that liquid. Other chemical fluids are likewise used for the same purpose.—R. E.]

COULSON, JUKES, & CO., 12 *Clements Lane, Lombard Street*—Proprietors.

Mineral substances used for the manufacture of paint; in their natural state, and pulverized.

ELLAM, JONES, & CO., *Markeaton Mills, Derby*—Manufacturers.

Emery—Granular rhombohedral corundum-stone, from Naxos, in Asia Minor: consisting of alumina, 86·0; silica, 3·0; oxide of iron, 4·0; and crocus (oxide of iron), for polishing fine steel and plated ware.

Mineral and vegetable colours (native and manufactured):

Mineral — sulphate of barytes, carbonate of barytes, carbonate of lime, syenite, cannel coal, mineral white, mineral black, blue-black, lapis calaminaris, dream ochre, gold ochre, mineral yellow, metallic red, umber, white rotten-stone, brown rotten-stone, bole armeniac.

Vegetable colours—Dutch pink, English pink, Brunswick green, Saxon green, Derby red.

ESTCOURT, SAMUEL, 2 *Green Terrace, New River Head*—Inventor and Manufacturer.

Sample of Indian blue, for the laundry.

HUMFREY, CHARLES, *Farnham Place, Southwark*—Inventor and Manufacturer.

Colours produced by the combination of fatty acids with metallic oxides and peroxides.

Specimens of candles and refined fatty matters.

JOHNSON, J. R., 12 *Bankside*—Inventor.

Extract of munjeet. Patterns of calico printed and dyed with the extract. Extract of madder. Patterns printed "topically" with the extract. Exhibited to illustrate a new process of extracting, economically, the colouring principle of the Rubiaceæ.

Printed calicoes, to illustrate a new process of madder dyeing, which is intended to replace garancine.

Pieces of calico printed topically with extract of madder.

[Extract of munjeet, or munjeeth, is obtained from the roots of *Rubia cordifolia*, an East Indian plant. It is imported into England from Calcutta. It is not so largely used as madder, which is furnished by the roots of another plant allied to *Rubia cordifolia*. The colour produced is said not to equal that of madder in brilliance and permanence.—R. E.]

LEATHART, CHARLES, 16 *John Street, Waterloo Road*—Inventor.

Liquid hair dye. The effect of the dye illustrated by a wig, in a case, containing four shades of hair.

LEE, CHARLES, 119 *Lower Thames Street, City*—Importer.

New black dyeing material, for dyeing [illegible]

McDonald, Archibald, *Hall's Building Yard, Aberdeen*—Inventor.

Patent composition for painting the bottoms of ships, to keep them clean from barnacles and vegetation; and two plates of oak and iron painted with it, which have been tested for more than a year.

Cotton worsted, dyed Turkey red.

Ship irons, galvanized.

[Metallic oxides—frequently the oxide of copper—are used for the above purpose. "Galvanized iron," is iron coated with zinc, by dipping it into the fluid metal. —R. H.]

Meigh, Job, *Dresden Mills, Shelton, Staffordshire*—Manufacturer

Samples of smalt.

[Smalt is an impure oxide of cobalt, mixed with a small proportion of potass and a large proportion of silica.]

Nicholls, William, *Chippenham.*

Fluid extract of annatto, &c.

[Annatto is prepared from the seeds of the *Bixa orellana*. It is used as a colouring substance.—E. F.]

Beaufort Hunt sauce.

Walker, R., *Victoria Works, Beverley*—Manufacturer.

Carbonate of lime, from the quarry, Victoria Works, Beverley; and Paris white, manufactured from it.

Godfrey & Cooke, 31 *Southampton Street, Covent Garden, and* 30 *Conduit Street*—Manufacturers.

Carmine, the colouring matter of cochineal (*Coccus cacti*). Lake, from cochineal, soluble in alkalies and ammonia. Oxide of bismuth. Carbonate of ammonia, the basis of smelling salts, spirit of sal volatile, &c. Oil of amber. Salt of amber. Artificial musk, and tincture of artificial musk. Watchmakers' oil, for fine machinery. Spirit of sal volatile. Essence of ambergris. Tincture of myrrh, and sundry drugs and chemicals.

[The beautiful pigment, *Carmine*, is a result of the precipitation of an infusion of the cochineal insect (*Coccus cacti*) in water, by means of alum. The carmine of commerce is so costly an article, that it is seldom to be met with in a state of purity. Pure carmine dissolves in ammonia. It is said, by some manufacturers, that a bright and clear state of the atmosphere is necessary to the preparation of carmine of the most brilliant colour.—R. E.]

Russell & Robertson, *Omoa Foundry, Holytown, Lanarkshire*—Inventors.

Specimens of white-lead paint, or ceruse, yellow chromate of lead, and red dichromate of lead; manufactured by a new process, and solely in the humid way.

The usual mode of converting blue lead into white lead, by the action of acetic acid, occupies, six weeks or two months, whereas by the new process the same end is attained in one day, without endangering the health of the workmen.

[White lead is the well-known pigment, which when ground in linseed oil is used in house painting. It is a carbonate of lead, generally containing hydrated oxide of lead, which is sometimes combined in the proportion of one atom of hydrated oxide to two of carbonate of lead. The most usual method (the Dutch) of manufacturing white lead is likewise the oldest. It consists in exposing lead to the joint action of acetic acid vapour, moist air, and carbonic acid gas. The lead is cast in the form of stars or gratings, and supported a little above the bottom of earthen pots (in shape like garden pots), into each of which a small quantity of weak acetic acid is placed. The re then built up in alternate layers, with spent tanner's bark, until a stack is formed; each layer of pots being covered with boards. The fermentation, which soon takes place in the tan, serves the double purpose of furnishing carbonic acid, and raising the temperature of the stack, which reaches 140° Fah. After a lapse of six or eight weeks the metallic, or blue lead, as it is called, is converted into porcelain-like masses of white lead, which is levigated in water, washed and dried. About 16,000 tons are annually made in England by this process. A very small quantity of acetic acid suffices for the conversion of a large amount of metallic into white lead; as, after it has combined with a portion of lead oxide to form neutral acetate of lead, this salt dissolves another atom of lead oxide, which is removed by the carbonic acid as carbonate of lead, and the neutral acetate set free, again to take up a fresh portion of newly-formed oxide of lead, produced by the action of the air on the metallic lead. Most of the new processes depend on similar reactions, with this difference, that oxide of lead (litharge) is employed instead of metallic lead: it is either made into a paste, with a small quantity of acetate of lead and water, or else dissolved either in a solution of neutral acetate, or neutral nitrate of lead, and submitted to the action of carbonic acid, produced by the combustion of coke or charcoal, which precipitates the dissolved litharge, leaving the acetate or nitrate at liberty to dissolve fresh portions. Another of the new plans consisted in precipitating a neutral salt of lead (the nitrate, for example) with an alkaline carbonate.—W. D. L. R.]

Blundell, Spence, & Co., *Hull, and* 9, *Upper Thames Street*—Inventors and Manufacturers.

Brunswick or Chrome Greens, of various tints and shades, used in oil painting and paper-staining.

Greens.—For painters, paper-stainers, &c., having a base of copper, viz., emerald green, green verditer, mineral greens, &c., &c.

Blues.—Chinese, Prussian, refiners, verditers, ultramarine, &c.

Ochres.—Yellow, red, brown, &c.

Yellows.—Chromes, all shades, King's yellow, patent yellow, Dutch pink, &c., &c.

Reds.—Red chrome, mineral and vegetable reds.

Lakes.—Carmines. Lakes of all colours and shades.

Browns.—Vandyke brown, umbers, terra de Sienna, York brown, &c.

Blacks.—Vegetable, animal, and mineral.

Whites.—Oxide of zinc, Cremnitz white, flake white, enamel white, satin white, Paris white, barytes (sulphate and carbonate), &c.

Leads.—Red, orange, grey, black, white (carbonate). White lead (oxi-chloride); a new invention, patented by H. L. Pattinson, Esq., of Newcastle-upon-Tyne.

Paints ground in oil, of every colour and variety of shade. Zinc white paint.—Unaffected by sulphurous gases, employed for a delicate dead white oil paint. Also a specimen of new drying oil, which assists its drying without impairing the delicacy of colour. Permanent and Paris green paints. Brunswick green paints. Metallic red paint. Anti-corrosion, of all colours and shades. Stucco Paint.—An oil paint used with water; invented by the exhibitors. Patent dryer. Composition for ships' bottoms. Oils.—Linseed oil, raw, refined, and boiled. Rape oil.—Brown, refined for locomotive engines, and double refined for burning in lamps.

Varnishes for coachmakers.—Body, carriage, filling, black japan.

Varnishes for painters.—Oak, mahogany, black japan, furniture, japanners' gold size, quick-drying copal for furniture. Mastic or picture. White hard spirit. Paper varnish. Turpentine varnish.

Green varnish for Venetian blinds, &c.

Black varnish for ships and iron work.

French polish.

Wood & Bedford, *Leeds*—Manufacturers.

Specimens of the varieties of lichen used in the manufacture of cudbear, orchil and litmus, including *Roccella fuciformis, Roccella tinctoria, Ramalina farinacea, Parmelia perlata, Parmelia tartarea, Umbilicaria pustulata,* and *Gyrophora murmia.*

Substances obtained from the preceding, by chemical analysis, including erythric, lecanoric, and roccellic acids, picro-erythrine, orcine, and ashes of Roccella fuciformis. Specimens of cudbear and orchil, and of their applications in dyeing and staining.

[Chemists have shown the presence of a variety of singular chemical principles in lichens used by the dyer. The colouring principles are *Orcine, Erythrine, Vulpuline, Strychnochromine, Lecanorine, Usnine,* &c. The colouring matter is used largely by the dyer, and by the chemist for the preparation of test-papers.—R. E.]

Winsor & Newton, 38 *Rathbone Place, and North London Colour Works, Kentish Town*—Manufacturers.

Artists' pigments, in the raw and manufactured states, and in the various forms of preparation, for use in water-colour and oil painting, and in decorative art; including manufactures and preparations of the madder colours, cochineal, lapis lazuli, uranium, cadmium, chromium, and all the rarer kinds of chemical pigments.

Sable, badger, hog hair, and other brushes and pencils employed in drawing and painting.

Preparations of canvas, panels, millboard, apparatus, and boxes fitted for the use of artists. Palettes, and various other implements and materials employed in the fine and decorative arts.

Oxide of zinc.

[Several of the rarer metals yield oxides, which form brilliant pigments. Some of these are useful in enamel painting, in consequence of their not undergoing alteration by the heat employed in that art.—R. E.]

Bramwell, Thomas, *Heworth Chemical Works, Newcastle-upon-Tyne*—Manufacturer.

Crystals of prussiate of potass of commerce.

Ferrocyanide of potassium of chemists, used for dyeing blue in place of indigo.

[*Ferrocyanide of potassium* is one of the most important chemical products to the dyer and calico-printer. It is obtained on the large scale by fusing animal matter with carbonate of potash and iron filings; cyanide, and subsequently ferrocyanide of potassium, are produced. Its compound formed on the addition of a salt of iron to ferrocyanide of potassium is of the most beautiful blue colour, and is called Prussian blue.—R. E.]

Marshall, John, *Leeds*—Manufacturer.

Nos. 1, 2, & 3. Acid and neutral extracts of indigo.

4 & 5. Carmine and liquid extract from purified indigo.

6. Refined indigo.

[Indigo is the produce of plants belonging chiefly to different species of indigo-tree; it is also obtained, to a smaller extent, from others. The state in which it exists in the juice of these plants is not well understood. It appears to be in the form of a colourless, soluble compound, and is generally obtained by fermenting the bruised plant, during which ammonia is evolved, and a yellow liquor obtained, which, on the addition of lime-water, and exposure to the air, deposits the insoluble blue substance called indigo. For the purposes of dyeing, the indigo is dissolved in sulphuric acid, with which it forms a distinct chemical compound.—E. F.]

7 & 8. Red and blue orchil paste.
9 & 10. The same, of medium quality.
11 & 12. The same, of fine quality.
13 & 14. Red orchil liquor for silk dyeing.
15 & 16. Concentrated red and blue orchil liquor.
17 & 18. Cudbear.
19 & 20. The same, of good and best quality.
21 & 22. Violet carmine, and best concentrated cudbear.
23, 24, 25, & 26. Valparaiso, Angola, Madagascar, and Cape de Verd orchella weed.

[These substances are prepared from various lichens, amongst which the *Roccella tinctoria, R. corallina, Lecanora tartarea, Variolaris lactea,* and *V. dealbata,* have been especially resorted to. These lichens are found on rocks on the sea-coast. The modes of treating them for the manufacture of the different dyes is the same in principle, though varying slightly in detail. They are carefully cleaned, and ground into a pulp with water, an ammoniacal liquor is from time to time added, and the mass constantly stirred, in order to expose it as much as possible to the action of the air. Peculiar substances existing in these plants are, during this process, so changed by the combined action of the atmosphere, water, and ammonia, as to generate the colouring matter, which, when perfect, is pressed out, and gypsum, chalk, or other substances are then added, so as to give it the desired consistency; they are then prepared for the market under the forms now exhibited.—E. F.]

27, 28, 29, 30, 31, 32, 33, & 34. Ground lac-dye,—X, OO, O, A (medium quality), D (medium quality), G (good quality), H (fine quality), and I (finest quality).

35. Essence of lac-dye.

[The lac-dyes are prepared by extracting the peculiar colouring matter of the "stick-lac" of commerce. This latter is a resinoid substance, the result of a secretion of several different plants—the *Ficus Indica, F. religiosa, Croton lacciferum,* and others—occasioned by the punctures of a small insect (the *Coccus ficus*) made for the purpose of depositing its ova. The branches become encrusted with a reddish-coloured concretion, which consists of the inspissated juice of the plant, imbued with a peculiar colouring matter derived from the insect. The preparation of them is usually carried out in India, the remaining substances, seed-lac and shell-lac, being also articles of commerce. The colouring matter, or dye, is extensively used as a substitute for cochineal.—E. F.]

36. Ground Bengal turmeric.

[Prepared from the roots of the *Curcuma longa.* Used as a dye, and also as a condiment.—E. F.]

Specimens of 36 kinds of European and native manufacture of lac-dye in India.

Tulloh, A., *Waltham Abbey*—Producer.

Saltpetre, charcoal, and sulphur, used in the manufacture of gunpowder at the Royal Gunpowder Mills at Waltham Abbey.

May & Baker, *Battersea, Surrey*—Manufacturers.

Specimens of nitric acid. Crystals of nitrate of silver. Trinitrate of bismuth. Rough camphor, as imported. Refined camphor in refining glass; camphor, prepared for sale. Precipitated chalk. White precipitate of mercury, Corrosive sublimate. Crude calomel. Prepared calomel. Red precipitate of mercury. Turpith mineral. Ponderous magnesia. Acetate of potash; acetate of zinc. Oxide of zinc. Sulphate of zinc, and chlorate of potash.

[*Nitric acid.*—The aquafortis of commerce consists of impure nitric acid. It is obtained from the distillation of concentrated sulphuric acid mixed with nitrate of potash or soda. The commercial substance called Chilian, or Peruvian saltpetre, is nitrate of soda, and has largely been used lately in the preparation of this acid. This acid is of immense importance in the arts, chemistry, and medicine.—R. E.]

DENTITH, W., & Co., *Manchester*—Manufacturers.

Ornaments of bichromate of potash, and of nitrate of lead.

Chromate of potash, prussiate of potash, and Whitby alum, used by calico-printers and dyers.

Green oxide of chromium, and oxide of zinc, used by china and earthenware manufacturers.

[By taking advantage of the elegant forms which various chemical substances assume on crystallizing, and inserting baskets of wire, or similar articles, into a crystallizable solution, the form of the article is preserved, but the character is altered by the development of exquisite crystals, which give the objects a peculiar and remarkable appearance.—R. E.]

FOX & BARRINGTON, 9 *Clarence Street, Manchester*—Manufacturers.

Common salt. Brimstone (sulphur). Salt cake (of soda). Barilla, or black ash (ball soda). Soda-ash (impure carbonate of soda). Bleaching-powder. Nitrate of lead. Chlorate of potash. Super-sulphate of soda. Tin crystals (chloride of tin). Blue or Roman vitriol (sulphate of copper). Nitrate of copper. Yellow prussiate (ferrocyanide of potassium). Red prussiate (ferricyanide of potassium). White, mottled, and yellow soda-soaps.

DAUPTAIN, GORTON, & Co., 17 *Wharf Road, City Road*—Manufacturer.

Four samples of ultramarine.

ELLERMAN, C. F., 1A *Beaumont Square, and Bovey Tracey, South Devon*—Manufacturer.

Samples of charcoal from lignite, for manure, and for combustion.

Samples of naphtha, of mineral oil, and of varnish, from lignite.

Fire clay goods. Block of lignite. The whole from lignite, obtained from Bovey Tracey, in Devonshire.

[The lignite of Bovey Tracey is of the tertiary period, and of fresh-water origin, presenting beds of altered vegetable matter alternating with clay and marl. The layers of coal vary in thickness from one to three feet, and as many as 18 or 20 are found in a thickness of 120 feet, but only seven beds are worked. The district yielding this fuel extends seven or eight miles, and the coal is chiefly in the state of bituminized wood. The coal burns imperfectly, emitting a disagreeable odour, and leaving a large quantity of ash. It is little used beyond the immediate neighbourhood, but as much good clay occurs overlying it, potteries have been established in the neighbourhood.—D. T. A.]

NAYLOR, WILLIAM, 56 *James Street, Oxford Street*—Manufacturer.

Decorative copal varnish, made from Sierra Leone gum copal. White hard varnish, made of picked gum sanderach; and mastic varnish, made of picked gum mastic.

New glass ventilators, opened and shut by the means of a rack and pulley, as a sun-blind.

Specimens of deal wood, stained to imitate different woods, without sizing; calculated to endure exposure, and admit of polish or varnish. The novelty claimed is the production of the stain without sizing.

HARRIS, T., *Newlyn, near Truro*—Inventor.

A model for working water-power.

LAWRENCE, WILLIAM, 163 *Sloane Street*—Manufacturer.

Specimens of cod-liver oil.

OGLEBY, CHARLES, & Co., 53 *Paradise Street, Lambeth*—Manufacturer.

Refined spermaceti in block, moulded in ornamental form.

Stearo-margaric acid in block, similarly moulded.

Candles manufactured from these articles.

PICCIOTTO, MOSE HAIM, 8 *Crosby Square, Bishopsgate*—Importer.

Specimens of fine flax, prepared in Italy by a peculiar process, applicable to all sorts of flax, steeped or unsteeped. By this process coarse produce may be brought to a great degree of fineness.

CHESHIRE, JOHN, jun., *Northwich*—Manufacturer.

A pyramid of best table salt, with several other specimens of salt. The salt springs in Cheshire are the greatest in Europe, and their annual production is upwards of 800,000 tons of salt.

KEATING, THOMAS, 79 *St. Paul's Churchyard.*

Jalap root, from Asia Minor.

Hay-saffron, from Asia Minor.

Kousso, or *Brayera anthelmintica*, from Abyssinia.

Matico, or *Piper angustifolium*, from Bolivia.

Sarsaparilla root, from Paraguay.

SCOTT, LANGSTON, 41 *Moorgate Street*—Manufacturer.

Large vase and small glasses containing white or oxide of zinc.

Various small painted boards.

Patent white zinc is principally used for house-painting in lieu of white lead; but it may be applied with great effect in the manufacture of crystals, paper-staining, card-enamelling, bleaching of lace, glazing of ware, for the down of artificial flowers, &c. It possesses brilliant whiteness, gives fresher tones than white lead to all colours, renders the paint or material prepared impervious to the action of gases, damp, &c., reflects artificial light, and preserves the materials. It is produced from spelter, and is principally imported in large flat slabs from Silesia, Galicia and Prussia: Russia, Belgium, and China send smaller supplies; the great European depôt is Hamburgh.

REID, JAMES, 16 *Oxford Street*—Proprietor.

Thirty-five specimens of sea-weed, collected from the south coast of England, by Miss Franklyn.

LEA, ALFRED, 150 *Oxford Street*—Inventor.

Myrrhine, a preparation for medical use.

TAYLOR, T., *Dublin*—Inventor.

Specimen of a rich iron compound pigment, for oil or water-colour painting, paper-staining, &c.; will not change colour by the action of sulphuretted hydrogen.

SECT. I. CLASS 3.

SUBSTANCES USED AS FOOD.

LIGHTON, JAMES, *Frampton, near Boston*—Producer.

Glass of honey, 19 lbs., produced under an improved system of bee management.

The honey is worked in the glass by the bees, and the glass requires no protection except a small piece of black calico, 18 inches square, to stand upon.

CARLETON, EDWARD, *Blaris, Lisburn, Ireland.*

Camomile flowers.

DOUBLEDAY, HENRY, *Coggeshall, Essex*—Producer.

Specimen of honeycomb.

BENTLEY, JOHN FLOWERS, *Stamford, Lincoln*—Producer.

Specimens of honey in the comb, free from pollen and brood cells, collected under Nutts' system of management, by ventilation. The weight of the produce of one stock of bees in 1849 is stated to have been 50 lbs.

KITCHENER, WM. CRIPPS, *Newmarket, Cambridgeshire*—Producer and Inventor.

Two specimens of honey taken in 1850, from the same hive, and at the same time.

Ventilated communicator, for obtaining honey free from impurity or discoloration.

DUTTON, ROBERT WILLIAM, 146 *Fleet Street*—Proprietor.

A glass containing a honeycomb.

HAMILTON, GEORGE AND PETER, *Oldham*—Manufacturers.

Specimens showing the different stages in the manufacture of flour from the wheat to the biscuit.

HILLS & UNDERWOOD, *Eastcheap*—Inventors and Manufacturers.

Samples of malt vinegar when first acetified, and when clarified; samples of brown malt vinegar, distilled vinegar, and distilled vinegar with vegetables.

BIVEN, & CO., *St. John's Lane, Gloucester*—Manufacturers.

Six bottles of champagne wine, manufactured in England from rhubarb stalk.

ROBERTS, WILLIAM HENRY, *British Wine Works, Laverock Bank, Edinburgh*—Maker.

Samples of "champagne sparkling hock," made in 1847 from Valentia raisins, grapes, sugar, sugar-candy, and honey, the extract being duly fermented.

"Madeira," made in 1836, from malt and sugar extract.

"Constantia Frontignac," made from Valentia raisins, sugar, and sugar-candy. The "Frontignac" is flavoured by an infusion of elder flowers distilled.

"Keeping beer," brewed in February, 1845, and October, 1847.

SMITH, MICHAEL, *Copper Alley, Dublin.*

Preserved pig; large and small hams, cured upon the "mild-cure" principle.

RITCHIE & MCCALL, 137 *Houndsditch.*

Specimens of preserved meats, poultry, fish, &c., the produce of the United Kingdom; and of beef, the produce of Moldavia, preserved at Galatz.

The process is by forming a vacuum in the canister by means of steam, and preserving the meat, &c. in that vacuum.

[It is a well-known fact that, in the absence of atmospheric oxygen, putrefaction is suspended, often entirely so. Such is the principle upon which the patent here adverted to depends. The vacuum must be very complete to render the preservation of food successful.—R.E.]

TAYLOR, ROBERT, *Dunmow, Essex*—Proprietor.

Flitch of bacon; the feeding, breeding, and produce of Dunmow, Essex.

LEONARD, J. & T. P., *Hull*—Proprietors.

Beef, prepared, cured, and rolled, so as to keep good for any length of time. The process of curing and mode of preparing were invented by John Tupling, in the exhibitors' employ.

PAYNE & SON, 328 *Regent Street*—Importers and Manufacturers.

Specimens of curry powder, curry paste, mulligatawny paste, Delhi chutnee, and curry sauce. Pickled mangoes (*Mangifera*), Limes (*Citrus cimmium*), bamboo (*Bambusa*), and green and red bird's-eye chili, from the East Indies. Bengal Club chutnee and curry and mulligatawny pastes, manufactured in Calcutta. Pistachia nut and kernel (*Pistacia*), used in confectionery, East Indies. Cashew nut (*Anacardus*), West Indies. Betel nut, the fruit of the *Areca catechu*, East Indies. Soy bean (*Soja hispida*), from which soy is made. Wild liquorice seed (*Glycyrrhiza*). Turmeric root and prepared turmeric (*Curcuma*), East Indies. Dahl, a species of lentil, much used in India. Paddy, rice in the husk. Gram (*Cicer arietinum*). Preserved ginger, from the East and West Indies; candied ginger China; green ginger, West Indies. Cumquot, or China orange, preserved in China. Guava jelly, Jamaica. Litchis, East Indies.

UNDERWOOD, G. H., *Pendleton, Manchester*—Inventor and Proprietor.

Preserved meat. This article is preserved without the use of salt, and it may be kept an indefinite length of time without deteriorating its quality; when cooked, it retains its nutritious qualities, and eats almost as fresh as recently-killed meat.

Whitney, James, *Calcer Hill, Hereford*—Inventor.

Beef preserved in a dry state.

Moyle, Samuel, *Bosvigo House, Truro*—Producer.

Fish cured, as an article of food.

Snowden, Robert, *City Road and East Road*—Inventor and Patentee.

Samples of the processes used in cleansing and purifying the coffee-berry from all fibrous matter, previous to roasting and grinding it.

Lebaigne, Honore, 10 *Little Titchfield Street*—Importer and Manufacturer.

Trinidad cocoa pod; cocoa from Grenada, St. Lucia, red Trinidad, grey Trinidad, Guyaquil, Maragnan, Caracas; Jamaica sugar, lump sugar, powdered sugar, arrow-root, tapioca; Iceland moss; Persian salep; cinnamon from Ceylon; cassia from China; vanilla from Mexico.

Chocolate and cocoa, showing the various stages of manufactures: roasted cocoa, cocoa nibs, cocoa milled, butter of cocoa, cocoa mixed with sugar, chocolate, cocoa powder, chocolate powder.

Chocolate of different kinds and shapes, and coffee.

Lebaigne, Honore, 10 *Little Tichfield Street*—Manufacturer.

Samples of chocolate for invalids. Imitations of Lisbon, Italian, and Spanish chocolate, in cake. Fancy chocolate in drops, silvered, marbled, &c. Vanilla, coffee, cinnamon, pistachios, liqueurs, pralines, cream, cigars, &c.

Cake of chocolate, three hundred pounds weight.

Fry, Joseph Storrs & Son, *Bristol.*

Specimens of the leaves, flowers, branches, and other parts of the cocoa-tree (from Trinidad) Theobroma Cacao (*Theobroma* signifies "Food of the Gods").

Cocoa, or cacao nuts.

Specimens of the ripe fruit from Trinidad and Grenada, with some cut open, showing the nuts within the pods.

Cocoa nuts—dark red, grey, pale red, and Spanish cured, imported from Trinidad.

Cocoa nuts—dark, ripe, and bright; imported from Granada.

Cocoa nuts—imported from Guayaquil and Para.

Other varieties from South America.

Vanilla pods from South America, used for giving a flavour to chocolate.

Roasted cocoa nuts from Trinidad and Grenada.

Husks of the nuts, called in commerce "cocoa shell."

The kernel of the nuts, called in commerce "cocoa nibs."

Pure chocolate and cocoa, ground and fit for use.

Specimens of some of the chief varieties of chocolate and cocoas. Paste chocolate. Croma and chocolate powder. Granulated, soluble, and flaked cocoa.

View of Port of Spain, in Trinidad, the principal shipping port of cocoa.

View of Naparima in Trinadad, the chief locality for the growth of cocoa.

Illustrations of the cocoa tree.

Drawing, showing the processes of the manufacture of chocolate and cocoa.

View of a "drying house" and "cocoa walk" at Arima, in Trinidad, which was constructed solely with the timber of one single tree of the cedar kind.

[*Theobroma cacao* is the tree which yields the cocoa of commerce. It belongs to the natural order *Byttneriaceæ.* Large forests of this tree, which does not attain a great size, exist in Trinidad, from which island, in 1841, upwards of two million pounds were imported into Great Britain. The total imports in the same year were upwards of three million pounds.—R. E.]

White, George Bailey, 147 *Shoreditch*—Importer and Manufacturer.

Different specimens of the West India cocoa, raw, roasted, and manufactured. Chocolate in its various stages of manufacture, with samples of the different kinds.

Shinton, Richard, *Spence's Street, St. George's Road.*

Samples of cocoa.

Lane, William Raynerd, 226 *Strand*—Inventor and Manufacturer.

Essence of coffee.

Budd, Joshua Thomas, 82 *Mount Street, Grosvenor Square*—Manufacturer.

Extract of cocoa.

Benham, W. A., *Cross Street, Queen's Square, Bloomsbury.*

Samples of Trinidad cocoa in its separate stages; the cocoa-nut (cacao), in its raw state, as imported from Trinidad; the nut as roasted; nibbed and divested of its outer bark or shell; and finally, its manufactured state.

[The consumption of cocoa, as an article of food, has greatly increased within the last few years. The West Indian kinds generally contain a larger proportion of the peculiar fatty matter (oil or butter of cocoa) than that which comes from New Grenada, and consequently are not so much valued. It forms a very digestible nutritious aliment, containing a peculiar azotized compound, *Theobromine,* analogous to that contained in tea and coffee. —J. W.]

Lambert & Butler, 141 *and* 142 *Drury Lane.*

Tobacco imported from America, Havannah, Holland, &c.; and specimens of the articles manufactured from it.

[The total quantities of tobacco retained for home consumption, in 1842, amounted to nearly seventeen million pounds. Professor Schleiden gives a singular illustration of the quantity of tobacco consumed. North America alone produces annually upwards of two hundred million pounds of tobacco. The combustion of this mass of vegetable material would yield about 340 million pounds of carbonic acid gas, so that the yearly produce of carbonic acid gas from tobacco-smoking alone cannot be estimated at less than 1,000 million pounds—a large contribution to the annual demand for this gas, made upon the atmosphere by the vegetation of the world.—R. E.]

Bremner & Till, 60 *Fenchurch Street*—Brokers.

Samples of tobacco.

Jonas & Brothers, 42 and 43 *Leman Street, Whitechapel*—Manufacturers.

Specimens of cigars of home manufacture; and of tobacco, imported from the Havanna; with samples of the raw material.

Jones, Ben., & Co., 39 *Brunswick Square*—Importers.

Chest of foreign cigars, and various smaller boxes of British manufactured cigars.

LUNDY FOOT & Co., *Dublin*—Inventors and Manufucturers.

Snuff: Lundy Foot's high toast, Scotch, and stalk snuff, made solely from the leaf and stalk of Virginia tobacco. Cavendish, negrohead, and other forms of tobacco, manufactured in imitation of the foreign or American.

TAYLOR, THOMAS GEORGE, *Hackney, Grove Street*—Grower and Manufacturer.

Tobacco of English growth and manufacture. Leaves of the plant prepared by exposure in a confined, dry, light, and warm place. Samples of manufactured tobacco dressed with treacle and oil. Cigars, free from dressing. Snuff, resembling high-dried Welsh, pure. The stem of the leaf roasted and ground.

[The botanical name of the tobacco plant is *Nicotiana tabacum*. Its cultivation in England is said by Mr. Loudon to be restricted to the extent of half a pole, and that only for botanical or medicinal purposes.—R. E.]

SALES, POLLARD, & Co., 57 *Red Cross Street, Cripplegate*—Manufacturer.

Cigars manufactured from Yara tobacco. It is shipped from the port of Manzanilla.

BUCKLAND & TOPLISS, *Barrington Crescent, Brixton*—Inventors and Manufacturers.

Specimens of "the cigarilla," for the use of smokers. Other aromatic and medicinal cigars.

COHEN & ORR, 41 *St. James's Street*—Importers.

Raw tobacco, and tobacco made into cigars by hand-labour at Havanna.

GOODES, GEORGE & SAMUEL, 12 *Prince's Street, Spitalfield*—Manufacturers.

Samples of British manufactured cigars; also, an arranged series, showing the process of manufacture.

RICHARDSON BROTHERS, *Edinburgh*—Manufacturers.

Tobacco, imported from Virginia into Leith.

Specimens of the raw material, as imported with the stalk on it, known as "leaf," or "unstemmed," tobacco; of the stalk extracted; and of "strip," or "stemmed" tobacco, which, after being damped with water, is manufactured into "twist," and made up into rolls; a cord is then wrapped round each 150, and put into a press for about a month, under a pressure of nearly five tons. The article, then, is "roll" tobacco.

Leaf tobacco and stalk.

Snuffs: black rappee, Scotch, and brown rappee.

FAULKNER, RICHARD and CHARLES, 44 *Jermyn Street, St. James'*—Manufacturers.

Specimens of English tart fruits, preserved in bottles, without sugar.

FORTNUM, MASON, & Co., 182 *Piccadilly*—Importers.

Preserved and dried fruits, and edible seeds, from various countries.

CLEMENS, JOHN, 25 *Mincing Lane, and Malaga*—Producer.

Jordan almonds. Raisins.

RICHARDSON, TIMOTHY, & SONS, 6 *Duke Street, Southwark*—Proprietors.

1. Golding hops, grown in the district called "the Hill," in Mid-Kent, used for the finest ales.
2. Golding hops, grown in East Kent, used for the same purpose as No. 1.
3. Golden hops, grown in the heart of Mid-Kent, and used for the best brown beers.
4. Jones's hops, grown in various parts both of Kent and Sussex.
5. Grape hops, also grown generally through the hop plantations.
6. Colegate hops, a hardy plant, but of inferior flavour; the cultivation of it has much increased of late years.
7—9. Hops grown in Essex, Suffolk, and Worcester.

[These hops are samples of the varieties in most estimation for the purposes of the brewer. The Goldings take their name from that of the grower who first introduced them; they are considered to be the finest, richest, and most valuable in the market, varying, however, according to the soil in which they are grown, and the treatment they receive. Jones's are of a shorter growth than the others, and are thus useful by enabling the grower to make use of the poles which would be too short for the Goldings or other varieties. Colegates are hardy, but backward at harvest, running much to vine, and capable of growing in comparatively poor soils. These qualities are, however, of advantage, as the inferior soils may thus be beneficially occupied by them, and their harvest takes place after the finer sorts are all in. The grape hop takes its name from its habit of growing in clusters like the grape. It is hardy, not so particular as to soil as the Goldings, and is generally very productive in yield.—J. W.]

ASHBURNHAM, JULIANA, The Dowager Lady, *Broomham, near Hastings*—Producer.

A bag of hops, grown within three miles of the sea, in the parish of Guestling, Sussex.

ATTFIELD, CHARLES, *Farnham*—Producer.

Packet of Farnham hops.

GOLDING, ROBERT, *Hunton, Maidstone*—Manufacturer.

Pocket of Mid-Kent hops.

PLOMLEY, FRANCIS, *Maidstone*—Designer.

Drawing of a magnified view of the formation and growth of the hop fungus, from its earliest to its latest stage.

PETERSON, THOMAS, *Trinity Chambers, Water Lane, Tower Street*—Agent.

Specimens of oilseed cakes.

BURN, ROBERT, *North Merchiston House, Edinburgh*—Importer, Designer, and Manufacturer.

Cotton seed with oil, and oil-cake imported from the colonies.

LE COUTEUR, JOHN, *Belle Vue, Jersey*—Producer.

Specimens and notes of produce of some of the most approved varieties of wheat cultivated in Great Britain, or elsewhere, arranged by J. Le Couteur, F.R.S., M.S.A., Aide-de-Camp to Her Majesty the Queen.

White winter wheat.

Var. No. 1. Triticum Hibernum Hybridum Candidum Epulonum Leucospermum of La Gasca, ex-Curator, Royal Gardens, Madrid.

1. Dantzic (Jersey). *See* grain. 52 imperial bushels to the acre.
2. Chidham. 1838.—18 lbs. of flour, produced 26 lbs. 4 oz. of excellent white bread. Nature dry.
3. Berkshire.
4. Lewin's Eclipse.
5. Clutton.
6. Whittington. 1841.—27 lbs. of flour produced 37 lbs. of good bread, rather brown. Keeps moist.
7. Brown's Chevalier. 27 lbs. produced 36 lbs. 14 oz. excellent white bread.
8. Canada.
9. Burrill, from Earl Spencer. 1842.—27 lbs. of flour produced 36 lbs. white bread.
10. Hardcastle.
11. Old Essex.
12. Pegglesham.
13. Ten-rowed Prolific.
14. Old Suffolk.
15. Earl Toham.
16. White Dantzic, Lincoln.
17. Old Lammas Prize, Devon.
18. Dantzic, Oxford.
19. Old Welsh white Lemon.
20. Mullybrack, Norfolk.
21. Pearl, Scotland.
22. French.
23. London Superior.
24. Royal Standard.
25. Baltic. 18 lbs. of flour produced 23 lbs. bread.
26. Kentish long.

Winter compact varieties (Fr. *Froments carrés;* Ger. *Vierzeilige Weizen*).

Var. No. 2. Trit. Hib. Album Densum, of La Gasca.

1. Jersey Pearl. 48 bushels to the acre. 18 lbs. of flour produced 24 lbs. of bread, white, dry nature. 1837.
2. Ducksbill, Kiel. 1836.—18 lbs. of flour produced 24 lbs. of bread, rather moist.
3. Britannia.
4. Buckland Toussaint, Devon.
5. Suffolk Thickset.
6. Mazzochino, Italy.
7. Buff Surrey.
8. Chili. 1848.—27 lbs. of flour produced 34 lbs. 12 ozs. brown heavy bread. Condemned, after seven years of trial, though suited to the stormy regions of the mountains of Chili.
9. Cape of Good Hope.
10. Coturianum Compactum, La Gasca. 58 bushels to the acre. 27 lbs. of flour produced 36 lbs. 2 ozs. white bread, of a moist nature.

Var. No. 3. Elongated winter wheat (Fr. *Froments alongés;* Ger. *Weizen Verlangen*).

Trit. Hib. Candidissimum Epulonum of La Gasca.

1. Dantzic, Jersey. See Grain, High-mixed, of commerce. 27 lbs. of flour produced 35½ lbs. of excellent white bread.
2. Cape of Good Hope, longest.
3. Cape of Good Hope. 1840.—27 lbs. of flour produced 37 lbs. 8 ozs. of white moist bread.
4. Malaga.
5. Lupo, Italy.
6. Gran gentil et Rosso. This seed was seven years in the hands of the late Secretary of the Society of Arts.
7. Van Diemen's Land.
8. Crim Tartary.
9. Var. High-mixed, Dantzic.

Var. No. 4. Downy, or hoary wheat (Fr. *Veloutés;* Ger. *Wolligweizen*

Trit. Hib. Koeleri of La Gasca.

1. Kentish Downy. See Grain, B. V. 55 bushels to the acre. 18 lbs. flour produced 26 lbs. of bread, excellent quality.
2. Guinea, Norfolk.
3. Turgidum.
4. Imperial Buff.
5. Tunstall rough chaff.
6. Italian.
7. Coturianum Confertum of La Gasca.
8. Red-grained
9. Chili, 1850— to be tried.
10. Jersey, 20 lbs. 6 ozs. of this flour, and 6 lbs. 10 ozs. of bran, produced 39 lbs. 1 oz. of good bread, second quality.

Var. No. 5. Red wheats (Fr. *Froments Rouges;* Ger. *Rath Weizen*). Trit. Hib. Glabrum Rufum of La Gasca.

1. Golden Drop. See Grain.
2. Red Hair Welsh.
3. Rattling Jack.
4. Old Red Norfolk.
5. New Red Norfolk.
6. Old Red Lammas.
7. Britannia.
8. Red Chaff Dantzic.
9. Blood-red Scotch.
10. Syer's.
11. York Square-headed.
12. Copdock.
13. Golden Prolific.
14. Red Burrill.
15. Essex.
16. Prolific.
17. Sark, very hardy.
18. White Golden Drop.
19. Gigantic
20. Grand Rubella.
21. Compact Red.
22. Kiel.
23. Cape of Good Hope. 1840.—18 lbs. of flour produced 26 lbs. 6 ozs. of brown bread, of a dry nature.
24. Pale red Cape.

Var. No. 6. Spring wheats (Fr. *Bleds de Mars Trémois;* Ger. *Springen Weizen*). Triticum Æstivum Candidum Epulonum of La Gasca. Beardless (*Sans barbes*).

1. Belle Vue Talavera (Col Le Couteur's Seedling). See Grain. 1838.—52 bushels to the acre. 1841.—27 lbs. of flour produced 35 lbs. 14 ozs. bread of the finest quality.
2. Old proved Talavera, Spain.
3. Malaga.
4. Italian.
5. Cape White. 1840.—27 lbs. flour produced 37½ lbs. white moist bread.
6. Mummy. Tombs of the Kings of Thebes. Sir Gardner Wilkinson. Raised at Belle Vue, from one ear, sent by M. Tupper, Esq. 1846.—27 lbs. flour produced 35 lbs. bread. Very light, white, superior.

Var. No. 7. Bearded (Fr. *Bleds-trémois barbus;* Ger- *Bartweizen*).

1. White Lily (Jersey). See Grain. 27 lbs. flour produced 38½ lbs. bread. Moist, white, superior.
2. Horned Red grain, Lincoln.
3. Brittany.
4. April.
5. Arthur's Jersey (hardy, and productive on poor soils.)
6. Black-jointed. 1841.—27 lbs. flour produced 37 lbs. of good bread.
7. Old White-hair Welsh.
8. Old Red-hair Welsh.
9. Rivetts.
10. Coetbo, Brittany, elongated.
11. Coetbo, „ compact.
12. Spanish.
13. Victoria, Caraccas
14. Kubanka of commerce.
15. Cape of Good Hope.
16. Italian Red.
17. Kiel, Baltic.
18. Italy.
19. Egyptian.

Total, 104 specimens.

Comparison and Result.

The Kentish or Jersey Downy Wheat:—In 1847, one *quarter, or* 463¾ lbs., produced 351¾ lbs. of flour, which produced 482½ lbs. of bread.

Baltic or Rostock Wheat:—In 1847, 454 lbs. of wheat produced 312 lbs. of flour, which produced 398½ lbs. of bread.

Downy, 482½ lbs.
Rostock, 398½ „

or 84 lbs. excess over the Rostock on one quarter; or excess over one acre, at 6 qrs. to the acre, 504 lbs. of bread—the supply of one person for a year. The excess over some more inferior varieties, as to quantity of produce and yield of flour, being far greater.

Those varieties to which explanations have been given, have all been tried by the exhibitor at Belle Vue.

SHEPPARD, ALFRED, *Ipswich*—Proprietor.

"Eggshell white" wheat, and "Chevalier" malting barley, grown in Suffolk. Malt manufactured at Ipswich.

WEBB, RICHARD, *Calcot Farm, Reading*—Producer.

Mummy Talavera wheat. Three grains of this wheat are said to have been found in the hand of an Egyptian mummy, and sent to Mr. Dobree, President of the Agricultural Society in Guernsey, who planted the same in his garden, and forwarded the produce to Col. Blagrove the following year. This produce he has successfully grown as a spring crop, and from it the present sample. grown by the exhibitor, is a specimen, the quality and crop being alike good.

[Much doubt has been raised as to the origin of the mummy wheats. The Egyptian wheat (*Triticum compositum*) is very different from the variety of common wheat (*Tr. vulgare*), called "Talavera." The Egyptian wheat has a head composed of three spikes, one erect in the centre, similar to the common wheat, and on either side another, not quite so large, attached to the base of the centre, and standing out at a small angle from it. Our climate is not suited to its growth, as, in the course of one or two years, the side spikes entirely disappear, and a coarse, thick-skinned grain is produced.—J. W.]

Specimen of the Wellington apple.

RAYNBIRD, ROBERT, *Hengrave, near Bury St. Edmunds*—Producer.

Sack of Kessingland wheat, grown upon a light soil, at Hengrave, Suffolk; this is a productive and new variety of wheat.

Sack of Chevalier barley, grown at Hengrave.

Sack of tick beans with white eyes, grown at Hengrave; a variety, called "Manchester white eyes."

RAYNBIRD, HUGH, *Laverstoke, Andover Road, Hampshire*—Producer.

Specimens of wheat produced by hybridization.

Specimens of Hopetoun and Piper's thickset wheat—the variety from which the hybrids were obtained, by fertilizing its pistils with pollen from the stamens of the Hopetoun wheat. To effect this, the stamens of the flower of the thickset variety were removed before they had reached maturity, by opening each of the glumes and carefully picking out the stamens upon the point of a needle: the pistils of the flower being left perfect, were a few days afterwards fertilized by dusting them with the pollen from stamens brought from the Hopetoun variety of wheat; this produced a great number of varieties, partaking more or less of the parent stocks, and from these the four specimens exhibited were selected.

[In the hybridization of plants experiments are always of much interest, and often productive of very important results, as the good qualities of two varieties may be obtained, or their bad qualities be counteracted. Hybrids obtained by the judicious intermixture of species, frequently produce seeds capable of giving origin to plants combining the characters of the two different parents;

but hybrids produced by species closely allied but really distinct gradually lapse into the one or the other of the originals, and thus become extinct.—J. W.]

KENDALL, JOHN, *Treverlin, Truro, Cornwall.*

Sheaf of white wheat, named "The giant straw wheat;" grown by the exhibitor in quantities of from 10 to 15 acres for the last 10 years. This wheat is stated to have produced, on an average, 60 bushels per acre. Its superiority consists in the length, size, and stiffness of the straw, and in its abundant produce.

CODD, RICHARD, *Wexford, Ireland*—Manufacturer.

Barley, grown in the county of Wexford. Malt, made from the same.

TAYLOR, JOHN, & SON, *Bishop Stortford, Herts*—Manufacturers.

Varieties of malt, viz.:—

Amber, used in brewing ordinary ales and porter.

Coloured, used for same purpose.

White, used in brewing pale ales.

Brown, used in brewing porter to give it flavour and colour.

[The various colours described are given to the malt by the different temperatures to which it is submitted after the germination is stopped. The essential oil contained in the barley is acted upon by heat, and different flavours are also produced. In the brown malt the saccharine matter is partially carbonized, and a peculiar empyreumatic flavour obtained.—J. W.]

WELLSMAN, JOHN, *Moulton, near Newmarket*—Manufacturer.

Sample of pale malt, manufactured from Chevalier barley.

MAUND, BENJAMIN, F.L.S., *Bromsgrove*—Producer.

Specimens of wheat, artificially hybridized, showing that its exterior form, and probably its chemical properties, can be modified, and its productiveness improved.

STALLARD, WILLIAM, *Brockhampton, near Ross*—Producer.

Australian creeping white wheat, imported about five years ago; it is stated to be of good quality in all seasons, free from mildew, &c., and yields a good produce.

STRANGE, WILLIAM, *Banbury.*

Stiff clay soil, without phosphate of lime or magnesia, and in cultivation, with 22 per cent. of phosphate of lime and magnesia. Sample of beans, growth of 1850, as per statement annexed.

WRIGHT, I., *Great Bentley, near Colchester.*

British grasses.

MILNE, WM., *Rhyvie, Scotland*—Producer.

One bushel of Scotch barley oats.

WALKER, WILLIAM, *Mossat, near Aberdeen*—Producer.

Sample of Kildrummie oats.

COUSENS, S., *Great Bentley, near Colchester*—Producer.

White wheat, new variety; weight of imperial bushel, 64 lbs. net.

FOX, JOHN JAMES, *Devizes*—Proprietor.

Specimens of red straw-white, Essex wheat, and of Nursery, Lammas, and Talavera red wheat, grown in Wiltshire.

STEVENS, RICHARD, *Stamford*—Producer.

Sample of wheat, Collyweston white.

CROUGHTON, WILLIAM PEEL, *Tenterden, Kent*—Producer.

Hoary white wheat; produce stated to be over quarters per acre.

Golden pod beans; produce, from which the sample is taken, stated at four quarters and six bushels per acre.

ASPREY, JAMES, *Sandleford, near Newbury, Berks*—Producer.

White trump wheat, grown on a very poor soil; weight, 67lb. per bushel.

IRVING, GEO. VERE, *Newton by Leadhills, Lanarkshire*—Producer.

Fleece of an aged ewe of the black-faced Highland breed, unlaid.

FORDHAM, THOMAS, *Snelsmore Hill East, near Newbury*—Producer.

Samples of improved white wheat; weight stated to be 66 lbs. per bushel.

Prolific beans; weight stated to be 70 lbs. per bushel.

IRWIN, ELIZABETH, *Ballymore, Boyle, Roscommon*—Producer.

Black barley, grown at Ballymore, in the county of Roscommon, Ireland, from African seed.

[Black barley is merely a variety of the common two-rowed barley (*Hordeum distichum*). In the course of cultivation the dark colour gradually disappears. It is a heavy cropper, and requires care at harvest, as, when the grain is ripe, the straw below the ear becomes very brittle and apt to break off.—J. W.]

BEXLEY, Lord, *Footscray, Kent*—Producer.

Bushel of white chittim wheat.

MOSES, H. E. & M., 87 *Tower Hill.*

Fine sample of Australian wheat, weighing 64 lbs. per bushel; the produce of Adelaide, South Australia.

Preserved fresh meats, prepared at the Camperdown establishments, Sydney, New South Wales. They are upwards of three years old, have undergone a voyage of 16,000 miles, are in a perfectly fresh state, and will keep so for any number of years.

GIBSON, CHARLES, *Pitlochry, Perth*—Producer.

Four bushels of English barley, grown by the exhibitor near Pitlochry, about 600 feet above the level of sea.

Hand-spun and hand-woven shepherd check plaid, composed of natural black and white wool from black-faced Highland sheep.

Hand-spun and hand-woven shepherd check plaid, composed of blue dyed and white wool from black-faced Highland sheep.

SADLER, WILLIAM JAMES, *Swindon, Wilts.*

"Laurence's prolixus," crystal white. This wheat has qualities which are considered to render it highly deserving of cultivation. The root is adapted to draw nourishment from an unusual depth in the soil, produces a strong straw, effectually resists the storm, affords a prolific yield; and its colour and weight are good. Yield of sample shown, stated at 66½ lbs. per bushel.

GUILLEREZ, ACHILLE FRANÇOIS, 37 *Castle Street, Edinburgh*—Producer.

The lentil, or *Ervum lens* of botanists—known and extensively cultivated in the earliest ages, especially in the east, being probably similar to the "red pottage" of Esau.

The exhibitor has cultivated lentils at South Queensferry, near Edinburgh, for two years; he has
grown and ripened in soil, manured by
small lentil and the large red (the common,

[In Egypt, Syria, and Hindustan, lentils form at the present day, a chief article of food among the labouring classes. They are also a common ingredient in French cookery, but are not very wholesome.—J. L.]

Westall & Co., 69 *Aldersgate Street*—Proprietors.

1. Fins of whalebone from Greenland (*Balæna mysticetus*).
2. Fins from the north-west coast of America.
3. Fins from the South Pacific Ocean.
4. White fins, from the western coast of Australia (*Balæna Australis*).
5. Finner, of the hump-backed whale (*Balænoptera Boops*).
6. Thirty-four specimens of whalebone.

[The fins or plates of "baleen" or whalebone are of an inequilateral triangular form, the largest, which are of most value in commerce, being arranged in a single longitudinal series on each side of the upper jaw of the "whalebone whales" (*Balænidæ*), descending vertically, and ending in a fringe of bristles: the smaller plates are arranged in oblique series, internal to the marginal ones. The base of each plate is hollow and is fixed upon a pulp developed from a vascular germ, which is attached to a broad and shallow depression occupying the whole of the palatal surface of the maxillary bones. The plates are so disposed as that their fringed terminations are directed downwards, and inclining towards the back part of the mouth, and they prevent the escape of the small marine animals which constitute the food of the great whales (*Balænæ*), and for the prehension of which this singular substitute for the teeth is adapted. The baleen plates are smallest at the two extremities of the series; the large intermediate ones sometimes attain the length of 15 feet, being above a foot broad at their base. There are about 200 plates in the outer row on each side of the mouth in the "true whale" (*Balæna mysticetus*). Each plate consists of a central coarse fibrous substance and an exterior compact fibrous layer: but this reaches to a certain extent only, beyond which the central part projects in the form of a fringe of bristles. The chemical basis of baleen is albumen, hardened by a small proportion of phosphate of lime. The baleen plates of the finners or hump-backed whales (*Balænoptera*) are smaller, and of less value than those from the true whales (*Balæna mysticetus*).—R. O.]

Gibbs, Thomas, & Co., *Half-Moon St., Piccadilly*—Importers and Producers.

Collection of dried specimens of grasses used in laying down land for permanent pasture, with seeds of the same. Specimens of wheat, barley, &c.; collection of various agricultural, kitchen garden, and other seeds.

Lawson, Peter, & Sons, *Edinburgh*—Producers.

Specimens of the vegetable productions of Scotland, comprehending all substances used for food in the chemical arts and medicine, in manufactures, and in house and ship building.

This collection is divided into six sections, as follows:—

1. Plants cultivated for their farinaceous seeds, together with their straw or haulm.
2. Plants cultivated for their herbage and forage.
3. Plants cultivated chiefly for their roots.
4. Plants cultivated for their uses in the arts, manufactures, and for various economical purposes.
5. Plants cultivated for their medicinal properties
6. Plants cultivated for their timber.

A detailed account of each specimen is contained in a *catalogue printed by the* exhibitors.

Wright, Henry, *Antingham, near North Walsham*—Manufacturer.

Malt, manufactured from barley grown by the Rev. Cremer Cremer, of Beeston, near Cromer, Norfolk.

Gentile, Joseph Pascal, *Harbertonford Works, near Totness, Devon*—Manufacturer.

Maccaroni and Italian pastes.
Prepared flour.

[The hard wheats are best adapted for the manufacture of these substances. They contain more gluten than the soft wheats.]

Prepared flour and cocoa as a chocolate.
Vegeto-animal food; a compound of the nutritious principles of meat and wheat.

Morris, Walter, *Yazor, near Hereford.*

Mangold-wurtzel grown upon the estate of Sir Robert Price, Bart., in Herefordshire. This kind of produce has been grown on the same piece of land, being reclaimed bog ground, for five successive years.

Watt, George, *Upper Balfour, Banchory, Scotland.*

Sample of barley, grown after turnips, in a five-course rotation, turnips, barley, hay, pasture, oats, with the ordinary farm-yard manure. Exhibited for quality.

M'Arthur, John, 51 *Grafton Street, Dublin*—Producer.

The roots of agricultural plants, partly dried for preservation, and partly in a growing state, in glass cases.

Adkins, John, *Wilsden*—Producer.

Italian rye-grass, sown 5th August 1850; samples cut 2nd December 1850, 9th January 1851, and 21st February 1851.

M'Killican, James, *Piperhill, Cawdor, Scotland*—Producer.

Sample of perennial rye-grass seeds (*Lolium perenne*), raised on the farm of Piperhill, Nairnshire. They are the produce of the third year's crop; weight 37 lb. 3 oz. per bushel.

Sample of white wheat, the produce of the first crop, from land formerly worthless, on the same farm, manured by 300 lbs. weight of Peruvian guano to the acre. Produce per imperial acre about five quarters; weight per bushel, 65 lbs. 1 oz.

Illingworth, Alexander, *Banchory Ternan, Scotland*—Producer.

English barley, weighing 59½ lbs. per bushel. Scotch birley oats, weighing 44 lbs. per bushel. Perennial rye-grass seeds, weighing 30½ lbs. per bushel.

Batty & Feast, 15 *and* 16 *Pavement, Finsbury Square*—Inventors and Manufacturers.

Vegetable productions preserved in distilled vinegar. A pine apple, with roots and leaves. An orange-tree, branches, and fruit, and branches of citron and fruit. Cucumbers, grown in England. A variety of preserved fruits and other comestibles.

Colman, J. & J., 9 *College Hill*—Manufacturers.

Specimens of starch, mustard, British gum, indigo blue, &c.

["British Gum" consists in reality of torrefied starch. The granules of starch, in its ordinary form, are enveloped in a thin pellicle, insoluble in cold water. By roasting the starch, the membranous envelopes are burst open, and their granular contents are then readily soluble in cold water. It is used, among other purposes, for thickening the colours of calico printers.—R. E.]

DAWSON & MORRIS, 96 *Fenchurch Street*—Importers and Manufacturers.

Samples of isinglass.

NOAK, W. & JOHN, *Droitwich*—Manufacturers.

Sample bottle of brine, obtained from springs at a depth of 173 feet, at Droitwich; and specimens of salt manufactured from the same.

DEWAR, THOMAS, *Newcastle-upon-Tyne*—Manufacturer.

Specimens of brown and white mustard seed, from which mustard for table use is made.

[The mustard of commerce belongs to the family of cruciferous plants. Its introduction as an article of extensive employment at the table, only dates from the beginning of the last century. It is principally cultivated in the North Riding of Yorkshire.—R. E.]

LEVY, WALTER, 2 *White Row, Spitalfields*—Manufacturer.

Specimen of Taganrog wheat; the same, granulated; the same, granulated, with the flour and bran extracted.

Samples of maccaroni celery and vermicelli.

TUCKER, RICHARD GRANT, *Lenton, near Nottingham*—Manufacturer.

Starch, used by the lace-dressers in Nottingham.

Gum substitute, used by cotton, silk, woollen, and wall-paper printers, for giving consistence to colours.

Adhesive, or label gum, suitable for postage stamps.

The residue, or glutinous matter, remaining after starch, is extracted from wheat.

[A large number of plants and vegetable substances contain starch. It is found in seeds, roots, tubers, and stems. It is often obtained from wheat which has become accidentally damaged. From its insolubility in cold water, it is easily washed out of any vegetable tissue which may contain it, and thus it may be partially separated from other substances present in the matter operated upon. But there are some from which it cannot be thus separated, and here, by an ingenious method, chemical decomposition is employed to get rid of them. The liquor in which some of the starchy particles are contained is allowed to ferment. By this means the gluten, albumen, &c., become, in a great measure, dissolved, and the starchy particles are left unaltered, and separate themselves by precipitation. The largest source of starch of late years has been the potato, from which it is obtained simply by rasping and washing.—R. E.]

TUCKER, EDWARD, *Belfast, Ireland.*

Glue and starch, produced at Belfast.

[The manufacture of the common and useful substance, glue, forms an interesting branch of the industrial arts. It is procured from the parings of hides, parchment, and refuse leather of all kinds. Such matters, after a preparatory cleaning in alkaline water, are boiled in large vessels for some time. The liquid is then run off and is found to be charged with an impure solution of gelatine; on cooling, the sheets of glue are left in frames to dry. This part of the process is often singularly affected by atmospheric vicissitudes. The state of the air during thunder-storms produces a remarkable effect on the glue, and often spoils the manufactured product. The substance commercially called "gelatine" is a very pure description of glue obtained, like it, from animal substances carefully selected and purified, so as to be fitted for human consumption. It has been largely used of late as a substitute for isinglass.—R. E.]

BROWN & POLSON, *Thrushcraig, near Paisley*—Manufacturers.

Patent powder starch, manufactured from sago flour.

Patent soluble starch, granulated, manufactured from potato flour.

Patent wheat starch, manufactured from wheat.

Arrow-root, manufactured by the exhibitors.

WITHERSPOON, ROBERT, *Glenfield Starch Works, Maxwellton, near Paisley*—Manufacturer.

Specimen of Glenfield patent powder starch, manufactured from sago.

RECKITT, ISAAC, & SON, *Hull*—Manufacturers.

Patent imperial wheaten starch, white and blue.

Patent soluble starch, blue and white, made from potato flour.

Patent sago starch.

Potato flour, used as a raw material in the manufacture of starch, and for stiffening Manchester calicos, muslins, &c.

Wheaten starch powder, used in perfumery and confectionery.

MILLER, DAVID & WILLIAM, *Musselburgh, near Edinburgh*—Producers.

Starch: household white, bleachers' wheaten, Royal blue, and sago flour. Scotch farina, Nos. 1 and 2. Arrowroot.

JONES, ORLANDO, & CO., *Battersea*—Inventors, Patentees, and Manufacturers.

Specimens of starch manufactured from rice, and of rough starch, hair powder, and gluten, obtained in the process of manufacture.

The process is the result of the discovery that a weak caustic alkaline solution had the property of separating starch from the gluten and fibrin with which it is combined in farinaceous substances. This process has enabled the patentee to substitute rice for wheat in the manufacture of starch, thus preserving wheat for the more important purposes of human food. This starch requires no boiling; and, being less hygrometric than wheat starch, retains a more permanent stiffness and glaze. The rough starch obtained in the process is valuable for feeding purposes, and for stiffening coarse fabrics.

PIESSE, SEPTIMUS, 43 *Molyneux St., Bryanstone Square.*

Lactine or artificial milk.

Samples of everlasting chlorine, a chemical mixture for eliminating chlorine gas slowly for disinfecting purposes.

Patchouly plant (*Pogostemon patchouly*), China and India; used in China as a perfume. Essence of patchouly.

Pistachio nuts (*Pistacia vera*, Linn.), from the shores of the Mediterranean and Spain; pistachio kernels; pistachio powder, used as a toilet powder.

BERGER, SAMUEL, & CO. *Bromley, Middlesex*—Manufacturer.

Specimen of rice starch, blue and white, made under the exhibitors' patent; also, samples of Madras and Bengal rice, from which this article is usually made.

HALL, THOMAS, *Lenton, near Nottingham*—Manufacturer.

Patent starch.

MCCULLUM, MALCOLM, 12 *Cannon Street, Leith*—Discoverer.

Specimens of the rhizome, or creeping stem, of *Typha latifolia*, or "large red mace." The Gaelic name is "morthan;" the central part is edible in its raw state; when dried and separated from the fibres, it affords a meal, or flour, of a sweet and agreeable taste, which can be made into bread or starch.

Sample of the meal. The fibres of the stem are a substitute for lint. This plant grows in abundance in lakes and marshy places, and is very prolific.

Edwards, Henry, 32 *Great Windmill Street, Haymarket* —Inventor and Manufacturer.

A mass of "custard powder," capable of producing 896 quarts. Composed of flour and other ingredients.

Clay, John, *Edgeley, Stockport*—Manufacturer.

Maize, or Indian corn.

American hominy, produced from maize, imported from New York.

English manufactured hominy, from Indian corn.

English manufactured flour, from the maize.

St. Etienne, Madame Daniele, *Harberton Ford, Totness.* — Agents, **Tootal and Brown**, 73 *Piccadilly*.

Specimens of wheat-gluten, mixed with wheat flour, or potato-flour. Used chiefly as food, especially for invalids, in the form of soups, puddings, biscuits, &c.

Specimens of vegeto-animal compounds for long voyages, &c.; prepared with wheat-gluten, and beef, veal, mutton, gelatine, poultry, fish, &c.; the same with fruits. Used in the preparation of soups, puddings, pies, and other dishes.

Specimens of chocolate, biscuits, &c., improved in nutritive power by the addition of wheat-gluten.

Specimens of starch and potato-flour, artificial sago, tapioca, arrow-root, &c.

Specimens of gums. Potato-flour and starch gums, all soluble in cold water.

Inferior gum-arabic, cleaned and granulated, with improvement in the quality. All these gums used as substitutes for natural gum for printing, chemical, and general purposes.

Moore, Edw. Duke, *Ranton Abbey, Eccleshall, Stafford*—Patentee.

Essence of milk, requiring only the addition of water to produce perfectly fresh milk. Samples combined with chocolate, cocoa, and coffee.

[In specimens similar to that described, inconvenience is often occasioned by the crystallization of the sugar of the milk, which is but sparingly soluble.]

Fadeuilhe, V. B., 19 *Newington Crescent*— Manufacturer and Inventor.

Consolidated milk for long sea voyages, and for medicinal and domestic use. After being dissolved in boiling water and reproduced in the form of milk, the solution will keep perfectly pure for four or five days; it may be boiled as often as required without "breaking;" and is miscible with all kinds of spirits.

[The preservation of the substance in question is due to the entire expulsion, by evaporation, of the watery constituents of milk. In the absence of a certain quantity of water putrefactive changes cannot proceed.—R. E.]

Glass, George Michael, *Brandon Street, Walworth*— Inventor and Manufacturer.

Gelatine for culinary and manufacturing purposes.

Gardner, John, 51 *Mortimer Street*—Discoverer.

Leaves of a tree, said to contain a nutritive crystalline principle, identical with that of Chinese tea (*Theine*), showing the leaves in their natural state, simply dried, also in various forms after having undergone the necessary preparations for use.

Assam Company.

Samples of tea, the produce of Assam (*Camelia thea*).

Assam became a British possession in 1826, at the conclusion of the Burmese war. The tea-plant was found to be indigenous there, but this fact was not generally known until the year 1834. In 1839, the Assam Company was formed. It is incorporated, and its object is the cultivation and manufacture of tea. Owing to impediments of various descriptions, its early operations were checked, and have been confined to the cultivation of about 1,000 acres. Until recently the results of the cultivation and manufacture of tea in a commercial point of view have not been ascertained. They are now fully established.

The tea realizes in England high prices, and is considered to be of fine qualities. It is entirely manufactured by natives of India.

Poole, Sarah Rebecca, *Kingston-on-Thames.*

Patent crystallized malt, used by porter brewers. Upon breaking a grain it will be seen that its substances has been converted into sugar; its properties consist in producing double the quantity of extract, and giving porter the desired flavour.

Perkins, Henry, *Hanworth Park, Surrey.*

A small loaf of sugar, made from sugar-canes grown by the exhibitor in the county of Surrey.

Kidd & Podger, *Isleworth, Middlesex*—Manufacturers.

Specimens of extra superfine flour dressed through Swiss silk machines, and manufactured from English wheat and Australian wheat.

Pakeman, William, *Bath Road, Hounslow*— Inventor and Manufacturer.

Sample of bread, manufactured from wheat, rice, and potatoes.

M'Cann, John, *Beamond Mill, Drogheda.*

Coarse cut oatmeal, used for making stirabout or porridge in Ireland.

Stonehouse, Alexander, *Dunning, Perth.*

Specimen of farina, used as food, and in manufactures.

Rogers, Jasper W., 88 *St. James's Street*— Inventor and Patentee.

Peat-fuel and peat-charcoal, made from peat moss, or sphagnum, produced from the peat or turf bogs of Ireland (which extend over 3,000,000 acres), known in France as "tourbe." Peat-fuels.

Peat charcoal powder, for refiners and pyrotechnists, and for medical purposes.

Granulated peat charcoal, for sanitary uses, in deodorization, &c.

Peat charcoal manure, composed of equal parts of granulated peat charcoal and sewage matter.

Specimens of peat moss, taken from the bog of Allen, Ireland.

Preparations of meal, flour, starch, &c., made from the potato.

The samples are part of a considerable quantity manufactured from diseased potatoes, by the paupers in the South Union Workhouse of Dublin, by order of the Irish Government, in the year 1846, under the direction of the inventor.

Styles, Thomas, 148 *Upper Thames Street*— Manufacturer.

Ashby's prepared groats, barley, and pea-flour, for the production of pure gruel, barley-water, light puddings, and food for infants, pea-soup, &c.

Chitty, Edward, *Guildford*—Manufacturer.

Flour.

Fitch, Fred. Chs., *Steeple Bumpstead, Essex*— Producer.

Sack of fine wheaten flour, manufactured from Essex wheat.

Specimens of 120 varieties of English woods, in blocks, half of each block being varnished and the other half unvarnished.

BUCK, P., & SON, *Danby Mills, near Middleham, Bradford*—Producers.

Double superfine flour; fine flour; wheat meal and oat meal. Exhibited for colour and quality.

SNOWDEN, ROBERT, *City Road and East Road*—Inventor and Patentee.

Samples of raw and roasted coffee, intended to illustrate certain patent processes of coffee roasting.

HAMILTON, GEORGE & PETER, *Oldham*—Manufacturers.

Specimens showing the different stages in the manufacture of flour from the wheat to the biscuit.

M'CANN, JOHN, *Beamond Mill, Drogheda*—Manufacturer.

Coarse cut oatmeal, used for making stirabout, or porridge, in Ireland.

GRUT, BENJAMIN, 1 *Sambrook Court*—Importer.

Cocoa (*Theobroma cacao*), a variety known in commerce as *Caracas cocoa;* little known in England, and consumed chiefly by the Spaniards of Spain and South America. It is produced on a plantation in the interior of New Granada.

THE LONDON SPICE TRADE—Importers.

Samples of spices and the places of shipment:—

No. 1. Mace, from Penang.

No. 2—4. Nutmegs; brown, from Penang; luned, from Batavia; and wild, from Singapore.

Nos. 5—7. Cloves, from Penang, Amboyna (Dutch produce), and Zanzibar.

Nos. 8, 9. Cinnamon, from Ceylon.

Nos. 10, 11. Cassia, from Canton.

No. 12. Pimento, from Jamaica.

Nos. 13—17. Black pepper, from Bombay, Tellicherry, Singapore, and Batavia.

Nos. 18—21. White pepper, from Tellicherry, Penang, Singapore, and Batavia.

Nos. 22—27. Ginger, from Jamaica, Cochin China, Calcutta, Sierra Leone, and Bombay.

Nos. 28—30. Carraway seeds, from Holland and Mogadore, and English.

Nos. 31, 32. Coriander seeds, from Madras, and English.

The TRURO LOCAL COMMITTEE—Producers.

Specimens of Cornish agricultural grains:—Black barley, skinless barley, grown and supplied by J. D. Gilbert, Esq., of Trelissick, near Truro. Indian corn, grown and supplied by Colonel Scoble, of Nansalvern, near Penzance.

Cornish red wheat, grown on the granite soils, especially adapted to the exposed situations in the neighbourhood of Penzance, and Cornish white wheat: the best sort to be grown on the high and exposed land of Cornwall; supplied by Mr. John Michell, of Feock, near Truro. Cornish barley, grown and supplied by the same, adapted for malting and grinding purposes. Agricultural produce, grown and supplied by the Rev. R. M. N. Eusticke, of Penwarne, in Mawnan, adapted for feeding cattle and poultry; grown on the poor and exposed peat soils of Cornwall.

GAMBLE, JOHN HENRY, 33 *Royal Exchange*—Manufacturer.

Canister, containing boiled mutton, found by Captain Sir John Ross, on Fury Beach, in latitude 72 deg. 47 min., and longitude 91 deg. 50 min. This is one of the canisters of preserved food, prepared by the exhibitor for the Arctic Expedition in 1824. It was landed from H.M.S. "Fury," on the beach where the ship was wrecked in Prince Regent's Inlet, and found by Captain Sir John Ross, in August, 1833, still in a perfect state of preservation, although annually exposed to a temperature of 92 deg. below, and 80 deg. above, zero. In 1849, when Captain Sir James Ross visited Prince Regent's Inlet in H.M.S. "Investigator," he found the provisions still in excellent condition. That the canister exhibited has been preserved above twenty-six years, and is still fit for food, is attested by Captain Sir John Ross. The food in this canister was preserved without salting.

Three canisters of preserved mutton and vegetables, preserved by the same process by Donkin, Hall, and Gamble, at Blue Anchor Road, Bermondsey, in the year 1813.

Canisters of preserved fresh beef, mutton, and veal; of fresh milk, cream, and custards; of fresh carrots, green peas, turnips, beetroot, stewed mushrooms, and other vegetables; of fresh salmon, oysters, cod-fish, haddock, and other fish; and of real turtle soup, mock-turtle soup, ox-tail and other soups.

Preserved hams for use in India, China, &c.

Callipash, callipee, and green fat for making real turtle soup, all preserved by the same process. Also soup and bouilli, for emigrants and troops at sea.

Pheasants, partridges, &c., preserved. The whole preserved so as to keep in any climate, and for an unlimited length of time.

[This method is the invention of M. Appert, in France, and was first practised in England by Messrs. Donkin, Hall, and Gamble. The process consists in placing the partially-cooked provisions into tin canisters, with a little bouillon or juice of the meat, then soldering on the covers, which have a small hole perforated therein. The tins are, after this, immersed, to a great portion of their depth, in a saline-bath heated above the boiling point of water, and left therein until the air has been expelled as completely as possible by the steam generated within them; the hole in the cover is now hermetically closed with a little solder, the tin being momentarily touched with a damp sponge to stop the egress of steam. The minute portion of oxygen still remaining in the tins enters into combination with the animal or vegetable matter at the induced temperature, and thus, further change is prevented. After the sealing of the tins, they are submitted to the ordeal of the testing-room, heated to a temperature above 100° Fahr.; if putrefaction takes place, the generated gases burst the tins, but those which pass uninjured remain perfectly good.—W. D. L. R.]

HARRIS, J., 2 *Hart Street, Mark Lane*—Inventor and Manufacturer.

Fæcal manure deodorised, containing all the fertilizing properties essential to vegetation, and suitable for every description of soil and climate; from 4 to 5 cwt. per acre.

Sect. I.

Class 4.

VEGETABLE AND ANIMAL SUBSTANCES USED IN MANUFACTURES.

King, Emma, *Church Street, Edmonton*—Producer.

Specimens of anatomical plants, arranged as an ornament.

Pursey, William Henry, 14 *Spring Street, Sussex Gardens, Paddington*—Manufacturer.

Flowers used as ornaments for garnishing meats, &c.; cut out of vegetables, such as carrots, turnips, beet-roots, &c.

[This curious art gives exclusive employment to several persons in the Metropolis.]

Harrison, Richard & John, *Hull*.

Specimens of English and Foreign Woods.

Alder, English.
Apple-tree, English.
Ash, English.
Ash, American.
Barwood, African.
Beech, English.
Beech, Dutch.
Birch, English.
Birch, American.
Birch, Russian.
Blackwood, East Indian.
Blackthorn, African.
Butternut, American.
Boxwood, Turkey.
Boxwood, Brazilian.
Boxwood, European.
Braziletto, Jamaica.
Brazilwood, Pernambuco.
Camphorwood, Brazils.
Camwood, African.
Canarywood, Brazils.
Canazuetta.
Cedar of Lebanon.
Cedar, Havannah.
Cedar (pencil), North America.
Cedar (red), New South Wales.
Cedar (white), New Brunswick.
Cherry-tree, English.
Chesnut (horse), English.
Cocus, West Indies.
Cocus (cut endwise), West Indies.
Coromandel, Ceylon.
Cotton-tree.
Cypress, Egypt.
Cypress, English.
Ebony (black), African.
Ebony (green), West Indies.
Ebony (marble), Ceylon.
Elm, English.
Elm Pollard, English.
Elm (rock), American.
Fustic, South American.
Giraffwood.
Greenheart, Demerara.
Gumwood (blue), New South Wales.
Gumwood (red), New South Wales.
Hackmatack, Canada.
Harewood, English.
Hemlock, New Brunswick.
Hickory, United States.
Holly (white), English.
Hornbeam, English.
Horseflesh-wood, Rio Janeiro.
Ironwood, Brazils.
Jakwood, East Indies.
Kiaboca, or Amboyna (trunk of), Singapore.
Kiaboca, or Amboyna (burr of), Singapore.
Kingwood, Brazils.
Kingwood, African.
Laburnum, English.
Lancewood (red), Cuba.
Lignum-vitæ, St. Domingo.
Lemon-tree, Sicily.
Lime-tree, English.
Locust-tree, North America.
Logwood, Bay of Campeachy.
Mahogany, Cuba.
Mahogany, St. Domingo.
Mahogany, Jamaica.
Mahogany, Honduras.
Mahogany, Bahama.
Mahogany, Panama.
Mahogany, African.
Mahogany, South Australian.
Maple, English.
Maple (Birds'-eye), American.
Maracaybo, Bay of.
Mosatahiba, Rio Janeiro.
Mulberry, Valparaiso.
Niagara-wood, from the Falls.
Oak, English.
Oak Pollard, English.
Oak, Memel.
Oak, Canada.
Oak (wainscot), Riga.
Oak, Dutch.
Oak, Botany Bay.
Oak, New Zealand.
Oak (live), North American.
Oak, African.
Oak, South American.
Olivewood, Leghorn.
Orange-tree.
Palm tree, Palmetto, Palmyra, India.
Paraiboo.
Partridgewood, Brazils.
Pheasantwood, Brazils.
Pear-tree (plain), English.
Pear-tree (stained), English.
Pear-tree (figured), English.
Pine and Fir, American White.
Pine and Fir, American Red.
Pine and Fir, Baltic Red.
Pine and Fir, Baltic White.
Pine and Fir, American Spruce.
Swiss Pine.
Pine and Fir.
Pine (Pitch), United States.
Fir, Scotch.
Pine.
Larch, Scotch.
Pine Fir.
Pine Cowdie, New Zealand.
Plane-tree Lacewood, Levant.
Plum-tree, English.
Poplar, English.
Quassiawood, West Indies.
Quassiawood, Brazils.
Red Saunders, or Rubywood, East Indies.
Rosetta, or Damsonwood, East Indies.
Rosewood, East Indian.
Rosewood, Mexican.
Rosewood, Brazils.
Rosewood, African.
Rosewood, Honduras.
Sabicû, Cuba.
Sandalwood.
Sapanwood, Siam.
Satinwood, St. Domingo.
Satinwood, East Indian.
Satinwood, Porto Rico.
Sassafraswood.
Saul, East Indies.
Snakewood, Surinam.
Sycamore, English.
Teak, Moulmein.
Teak, African.
Tambookie.
Totario.
Tulipwood, Brazils.
Tulipwood, Botany Bay.
Tulipwood, French.
Valparaiso wood.
Violetwood, Brazils.
Walnut, English.
Walnut (black), Mexican.
Walnut (black), American.
Willow, English.
Yellow-wood, East Indies.
Yew, English.
Zebrawood, Brazils.
Several specimens of unknown wood.

Sanders, W. Wilson, *Wandsworth*—Proprietor.

Collection of woods, amounting to upwards of 700 specimens, from various parts of the world, arranged geographically; with scientific name, native or local name, native country, weight per cubic foot, principal uses or peculiarities; with specimens of veneers of the more beautiful or interesting woods. The block specimens are without varnish of any kind. The veneers are varnished so as to show the beauty of the woods.

Stowe, Henry, *Buckingham*—Inventor.

Specimens of wood, stained without heat or moisture; the process being equally applicable to it when carved.

Enderson, Henry John, 140 *Praed Street, Paddington*—Producer.

Grained imitation of bird's-eye maple and other fancy woods, on deal. Imitation of inlaid marbles and fancy woods, on slate.

Esdailes & Margrave, *City Saw Mills, Regent's Canal*.

Sawn veneers, of mahogany and other hardwoods, as used by cabinet-makers.

The specimens exhibited show the produce obtained by the circular sawing machinery of this country.

There are two methods of cutting veneers:—1st. By sawing or dividing by a serrated instrument, involving necessarily a certain degree of waste, but producing an unbroken surface, and, therefore, a sound veneer. 2nd. By cutting or splitting, involving no waste, but in a greater or less degree, disturbing the grain of the material, and rendering it, therefore, less durable.

The former mode is preferred in this country.

Newton, Charles Henry, *Plough Bridge, Rotherhithe, Surrey*—Manufacturer.

Specimens of English and Foreign woods, prepared on one side and rough on the other, to show the application of the patent desiccating process in the seasoning of woods. By this process, wood is seasoned and made fit for use in a few weeks. The moisture is evaporated by rapid currents of hot air, by which decay and dry rot are, in a great measure, prevented.

Bethell, John, 8 *Parliament Street, Westminster*—Inventor and Patentee.

Specimens of wood saturated with oil of tar, by the process called "creosoting."

Creosoted sleepers, which have been in use for years on the Northern and Eastern, and London and North Western railway. A piece of unprepared wood, showing the ravages of the *teredo navalis.* A piece showing those of the *limnoria terebrans,* with a few holes bored by the teredo.

Two slices, cut from creosoted piles, which have been four years in the sea, at Lowestoft harbour.

Specimens of fish, prepared for manure, by the creosote oil.

[Several plans have been patented, having for their object the prevention of timber from decay by injecting certain fluid substances into its pores, and by chemical and mechanical action preventing the growth of fungi—viz., Mr. Kyan's patent, in 1832, for impregnation with corrosive sublimate; Sir W. Burnett's, in 1836, for injecting chloride of zinc; Mr. Bethell's, in 1838, for impregnation with oil of tar; and Mr. Payne's, in 1841, for impregnation with metallic oxides or alkalies.—S. C.]

Samuels, David, 71 *Lebon Street, West Ham, Essex*—Inventor and Manufacturer.

Picture frame of various English woods.

Brotherton, William, & Co., *Hungerford Wharf*—Importers and Manufacturers.

Samples of rape seed, the produce of Holland and the East Indies. Rape Seed bruised previous to extracting the oil. The oil as extracted; as refined and purified. Olive oil in its original state; as refined for machinery. Almond oil as extracted; as refined for the finer descriptions of mechanism.

Barclay & Son, 170 *Regent Street*—Manufacturer.

Specimens of bleached wax; wax candles, white and coloured; sperm candles, white and coloured; stearine candles; candles of mixed materials; wax and composition mortars for night lights and for heating dishes; with sundry small articles.

Cross, J. Samuel, 57 *Bunhill Row*—Proprietor.

English-grown woods, with their botanical names and some of their various uses.

FOREST AND PARK WOODS.

No.	*Botanical Name.*	*Popular Name.*	*Habitat—Uses.*
1	Robinia Pseudacacia . .	Acacia Locust-tree .	Chair-making; cricket-stumps and turnery; posts, &c.
2	Thuja occidentalis, or T. orientalis.	American Arbor Vitæ or Chinese .	*Asia and America* (scarce).—Fancy cabinet-work, inlaying, &c.
3	Fraxinus excelsior.	Ash . .	*Europe and North of Asia.*—Every description of carriage building, agricultural implements, and felloes for wheels; handles of every kind; various turnery; bent for hoops and measures, &c.
4	Pyrus aucuparia	Ash, Mountain	
5	. .	Ash, Drooping	
6	Alnus glutinosa	Alder . .	*Europe and Asia.*—Pattens, clogs, hat-blocks, broom-sticks, brush-boards, rollers for silk goods, and various toys and turnery; makes the best charcoal for copper-smiths and gunpowder; the bark used in light tanning.
7	Populus tremula	Aspen, see Poplar.	
8	Fagus sylvatica	Beech . .	*Europe.*—Foundations of large edifices, and building in general; oil-mill stampers, cabinet, chair, and bedstead making; saddle tree and last making; cut for screws; plane making, and tool handles; wheelers' work, and felloes for wheels; large letters for printing, brush-boards, and bottoms of ships and barges; turnery, fire-wood for pastry-cooks, and glass-bending.
9	Fagus sylvatica	Beech, White	*North America.*—The same purposes.
10	Betula alba . .	Birch . .	Bottoms of pattens and clogs, turnery, reels, and toys.
11	Buxus sempervirens.	Box . .	*European and Turkey.*—Wood engraving, turnery, fancy work, &c.
12	Abies cedrus .	Cedar of Lebanon.	Valuable as an ornamental tree; available for fancy box-making, cabinet and other fancy work.
13	Æsculus hippocastanum.	Chestnut, Horse.	Inlaying cabinet work, Tonbridge ware, brush-boards, stained ornamental work, and common buildings.
14	Castanea vesca .	Chestnut, Spanish.	*Europe.*—Carving, interior of ecclesiastical and other buildings, cabinet-work, &c.
15	Pyrus malus .	Crab . .	(Very hard).—Engineering purposes, turnery, &c.
16	Cornus sanguinea	Dogwood .	Chiefly for skewers (small).
17	Ulmus . . .	Elm . .	*Europe.*—For bottoms of ships and barges, ships' blocks, gun-carriages, mast caps, piles for foundations, railway sleepers, wheelwrights' and millwrights' purposes; bored for pipes and pumps; large turnery, and culinary purposes; naves for wheels; coffins, bellows, scale-board making, &c.
18	. .	Elm, Dutch, or Sand.	Press-making, &c.
19	Ulmus montana	Elm Wych .	Boat-building, and some of the above-mentioned uses.
20	Abies larix .	Larch Fir .	Cabinet-work, building purposes, railway sleepers, fencing, posts, gates, &c.; the bark used for tanning.
21	Pinus sylvestris.	Scotch Fir .	Chiefly used for building purposes, railway sleepers, fencing, &c.
22	Abies picea . .	Silver Fir .	
23	Abies excelsior .	Spruce Fir .	
24	. .	Pine Fir .	
25	Corylus avellana	Hazel . .	Hoop handles, small turnery, fishing-rods, cotton-reels, pea-sticks, &c.
26	Carpinus betulus	Hornbeam .	Cogs for mill-wheels, mallets, skittles, and hard-turnery.
27	Ilex aquifolium	Holly . .	Engraving blocks for silk and calico printing, fancy cabinet-work, whip-sticks, small turnery.
28	Cytisus Laburnum.	Laburnum .	Used for turnery.
29	Tilia Europæa .	Lime . .	Carving purposes, musical instruments, piano-forte keys, cutting-boards, &c.
30	Syringa vulgaris	Lilac	
31	Acer campestre.	Maple .	Fancy cabinet-work, veneering; chair, musical instrument, and frame making.
32	Cerasus avium .	Merry, or Wild Cherry	Chair-making, &c

FOREST AND PARK WOODS—*continued.*

No.	*Botanical Name.*	*Popular Name.*	*Habitat—Uses*
33	Quercus pedunculata.	Oak . .	Ship-building timbers as, futtocks, knees, stem and stern posts, top-timbers, floors, and planks for covering the frame; barge and boat-building, dock-gates, and large buildings generally; railway carriage building, liquor-back making, and engineers', wheelwrights', and carpenters' purposes; railway sleepers, piles, coffins, and furniture generally; stocks and spokes for wheels, posts, rails, and cleft-pales for fencing, &c.; the red for fancy cabinet-work; the bark the principal ingredient in tanning leather.
34	Quercus cerris	Turkey Oak .	(Scarce.)
35	Quercus lex .	Evergreen Oak	(Scarce.) Used by millwrights, &c., for cogs for water-wheels.
36	Platanus . .	Plane Tree .	Rough buildings, brush-boards, and many purposes for which beech is used.
37	Populus canescens . . .	Poplar, or Abele.	Breaks of railway carriages, and used in paper-mills; leather-cutters' boards, and rough buildings, and some times for life-boats.
38	Populus nigra .	English Poplar.	
39	Populus fastigiata	Lombardy Poplar.	
40	Acer pseudo-platanus.	Sycamore .	Musical instruments, churns, turnery, bread plates, carving, chair-making, brush-boards, &c.
41	Salix caprea .	Sallow, see Willow.	
42	Pyrus domestica	Service . .	(Scarce.) Used as lime-tree.
43	Liriodendron tulipifera.	Tulip-wood .	(Very scarce.) Fancy cabinet and box-making.
44	Cratægus oxyacantha.	Whitethorn .	(Hard.) Used by millwrights for cogs
45	Prunus spinosa .	Blackthorn .	(Small.) Whip-stocks and walking sticks.
46	Rhamnus catharticus.	Buckthorn .	(Scarce and small.)
47	Salix . . .	Willow . .	Cricket-bats and small turnery; split and wove for ladies' bonnets, foundations of hats, &c.
48	,,	Willow, Weeping.	
49	Taxus baccata .	Yew . . .	Fancy cabinet-work and inlaying; bows for archery; rustic chairs, whip-stocks, &c.

ORCHARD WOODS.

50	Amygdalus communis.	Almond.	
51	Pyrus malus .	Apple . .	Chair-making, turnery, &c
52	Cerasus . .	Cherry . .	Fancy chair, furniture, and turnery.
53	,,	Damson. .	
54	Sambucus nigra	Elder . .	Shoemakers' pegs, &c.
55	Juniperus communis.	Juniper.	
56	Mespilus germanica.	Medlar . .	(Scarce.)
57	,,	Mulberry .	Fancy work and turnery.
58	Pyrus communis	Pear . .	Blocks for engraving on silk, cotton, &c., paper-staining, chair-making, &c.
59	Prunus domestica.	Plum . .	Fancy cabinet-work.
60	Juglans regia .	Walnut . .	Furniture and fancy cabinet work; gun and pistol stocks
61	Juglans nigra .	Black Walnut	The same purposes.
62	Cydonia vulgaris	Quince.	
63	. .	Wild Pear .	Best wood for receiving a black stain.

NOTE.—The woods not marked with their uses are valuable for their fruit-bearing or ornamental properties.

FAUNTLEROY, ROBERT, & SONS, *Potters Fields, Tooley Street, London.*

Classification of specimens of Foreign Hard-woods, for Cabinet Work, Turnery, Dyeing, and Machinery; also, of Elephants' Tusks, Sea-Horse Teeth, Mother-of-Pearl Shells, &c.

Names.	*Place of Produce.*	*Purposes.*
1. Amboyna, or Kiabooka (*Pterospermum indicum.*)	E. Indies, Borneo, Amboyna.	Cabinet-work.
2. African black wood (*Cocobolo prieto*).	Africa, Madagascar, &c.	Turning.
3. Angica	The Brazils . . .	Cabinet-work and turning.
4. Barwood (*Baphia nitida*)	Africa, (W. Coast)	Dyeing and turning.
5. Beefwood, or Bully tree (*Robinia panacoco*).	Guiana (Demerara)	Machinery and turning.
6. Botany Bay Oak (*Casuarina stricta*).	N. S. Wales . . .	Turning and brush-making.
7. Boxwood (*Buxus balearica*).	Turkey	Turning, machinery, and wood engraving, &c., &c.
Boxwood (*Buxus sempervirens*).	England, Spain, &c.	Turning.
Boxwood.	America	
Boxwood (*Buxus emarginatus*).	East Indies. . .	
8. Brazil wood (*Cæsalpinia Braziliensis.*)	The Brazils . .	Dyeing and turning.
9. Braziletto (*Cæsalpinia Bahamensis*).	Jamaica and the Bahamas . . .	
10. Cam wood (*Baphia nitida*)	Africa, West Coast.	
11. Camphor wood (*Camphora officinalis.*)	China, Borneo, &c.	Cabinet-work.
12. Canary wood (*Laurus indica*).	The Brazils, &c. .	Cabinet-work and turning.
13. Cedar (pencil) (*Juniperus Virginiana*).	The United States.	Pencils, and cabinet-work.
14. Cedar (Cuba) (*Cedrela odorata*).	West Indies, Havana	Cabinet-work.
15. Cocus wood (*Amerimnum ebenus*).	Jamaica	Turning, &c.
Cocus wood (*Granadilla*)	Cuba	
16. Coromandel or Calamander (*Diospyros hirsuta*).	East Indies (Ceylon, Manilla, &c.)	Cabinet-work and turning.
17. Ebony (black) *Dombeya melanoxylon*).	Africa, W. Coast	Turning and cabinet-work.
Ebony (black) (*Diospyros ebenum*).	Mauritius and Madagascar.	
Ebony (black) (*Diospyros ebenaster*).	Ceylon	
Ebony (black) *Diospyros melanoxylon*).	Bombay, &c., Sumatra, &c. .	
18. Ebony (Green) (*Aspalathus ebenus*).	Jamaica and the Bahamas.	Dyeing and turning.
19. Fustic (*Maclura tinctoria*)	W. Indies (Cuba, also Savanilla.)	
Fustic (*Rhus Cotinus*). .	Ionian Islands, (Zante.)	Dyeing.
20. Hickory (billets) (*Juglans Alba*)	The United States	Handspikes, fishing-rods, &c.
21. Ironwood (*Sideroxylon, &c.*)	East Indies.	Machinery and turning.
22. Jackwood (*Artocarpus integrifolia*).		Cabinet-work and turning.
23. Kingwood (*Spartium arbor*).	The Brazils . . .	Turning and cabinet-work.
24. Lancewood spars (*Guatteria virgula*).	West Indies (Cuba, Jamaica).	Gig shafts, archery bows, &c.
25. Letterwood or Snakewood (*Brosimum aubletii*).	Guiana and the Brazils.	Turnery and archery bows.
26. Lignum vitæ (*Guiacum officinale*).	West Indies (St. Domingo, Jamaica, Porto Rico, Cuba, Honduras, the Bahamas . .	Sheaves for ships' blocks, turning, and machinery.
Lignum vitæ (*Guiacum officinale*).	Australia	Turning.
27. Logwood (*Hæmatoxylon Campechianum*).	West Indies, also Central America.	Dyeing.
28. Madagascar red wood . .	Madagascar . . .	Turning and cabinet-work.
29. Maple (bird's-eye and Rock) (*Acer saccherinum*).	North America	Cabinet-work.
Maple (Russian) (*Acer tataricum*).	Siberia, &c. .	
Maple (English) (*Acer campestre*).	England . . .	
30. Nicaragua wood (*Cæsalpinia hæmatoxylon, &c.*).	Central America, &c.	Dyeing.
31. Nutmeg wood (*Areca catechu*).	The Brazils (Para)	Turning and cabinet-work, umbrella and parasol sticks, &c.
32. Palm-tree (black) *Cocos niepere*).	East and West Indies . .	
Palm-tree (red and brown) (*Cocos nucifera*)		
Palm-tree (prickly brown) (*Cocos guianensis*).		
33. Partridge wood (brown and red) (*Heisteria coccinea*).	The Brazils and West Indies .	
34. Pheasant wood (*Heisteria coccinea*).		
35. Princes wood (*Cordia Gerascanthus*).	West Indies (Jamaica.)	

Names.	*Place of Produce.*	*Purposes.*
36. Purple wood (*Copaifera rubiflora*)	The Brazils and West Indies	Turning and cabinet-work, umbrella and parasol sticks, &c.
37. Queen wood, or Jugeca wood (*Laurus chloroxylon*)		
38. Red sanders wood (*Pterocarpus santalinus*).	East Indies (Calcutta, &c).	Dyeing and turning.
39. Rosewood (*Mimosa Jacaranda*).	The Brazils (Rio de Janeiro and Bahia	Cabinet-work, turning, and brush-making.
Rosewood (*Amyris balsamifera*).	Honduras, &c.	
Rosewood (*Dalbergia latifolia*).	East Indies	
40. Rosetta wood		
41. Sabicu	Cuba	Ship-building and furniture.
42. Sandalwood (*Santalum album*)	East Indies	Perfumery and cabinet-work.
43. Sapanwood (*Cæsalpinia Sapan*)		Dyeing.
44. Sapodilla (*Fagara pterota*).	Honduras	Machinery and turning.
45. Satin wood (*Chloroxylon Swietenia*).	East Indies	Brush-making, cabinet work, and turning.
Satin wood (*Chloranthus, &c.*)	West Indies (St. Domingo, Porto Rico, & the Bahamas)	
46. Tulip wood (*Liriodendron-tulipifera*).	The Brazils	Cabinet-work and turning.
47. Walnut wood (*Juglans regia*).	Italy and Belgium	Cabinet-work and gun-stocks.
48. Yew tree (*Taxus baccata*)	England and Spain	Archery bows and turning.
49. Zebra wood (*Omphalobium Lamberti*).	The Brazils	Cabinet-work and turning.
An elephant's head, with tusks and grinders complete.	Africa, W. Coast.	
Elephants' tusks	Africa — Camaroon, Gold Coast, Angola, and The Cape	Cutlery, turning, carving, &c.
Elephants' tusks	Calcutta, East Indies, and Alexandria	
Elephants' grinders	Africa.	
Sea-horse, or Hippopotamus, teeth (curved and straight).	East Indies and Africa	Dentists and turning.
Sea-cow, or walrus, teeth	Hudson's Bay	
Sea-unicorns' horns		
Mother-of-Pearl shells (white edge).	Sincapore	Button-making, turning, and fancy work.
Mother-of-Pearl shells (yellow)	Manilla	
Mother-of-Pearl shells (black)	Tahiti	
Mother-of-Pearl shells (Bombay)	Bombay	
Mother-of-Pearl shells (Buffalo)	S. America	
Coquillo nuts (*Attalea funifera*), a kind of palm tree, which yields the fibres now in use for coarse brooms, &c.)	Brazils	Turning.
Corozo, or Corusco nuts (*Phytelephas macrocarpa*)	Colombia	

A solid circular slab of Honduras mahogany, 7 feet 6 inches in diameter

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Watson, Thomas John, 3 *Devonshire Terrace, Fulham Road*—Manufacturer.

Samples of olive oil as imported, and as purified; as chemically pure, and as divided into margarine and oleine. Linseed oil as produced, and as purified. Poppy oil purified. Nut oil purified. Seal oil; the same purified. Acetate of lead produced in three days and a half.

[Olive oil is the product of the fruit of *Olea Europæ*, a Mediterranean tree. Linseed oil is from the seeds of *Linum usatissimum*, the common flax. Poppy oil is from the seeds of *Papaver somniferum*. Nut oil from hazel nuts, the fruit of *Corylus avellana*.—J. L.]

Bauwens, L. F., *Grease Works, Wakefield*—Manufacturer.

Products of various patent processes used in extracting pure oils and greases from the refuse soap-suds of woollen, silk, and other manufactories.

Ross, William Anderson, 66 *Upper Thames Street*—Manufacturer.

Palm-oil grease, for fast trains. White grease, for machinery, &c. Liquid grease, for mining purposes.

Clarified machinery oil, will not gum or clog. Clarified burning oil, to burn equal to sperm oil. Body, carriage, and oak varnishes.

Ironwork black, equal to black japan, dries in half-an-hour.

Red, blue, yellow, and purple paints supplied to Messrs. Fox, Henderson, & Co., for decorating the Exhibition Building.

White zinc antioxide paint for ironwork, stucco, &c.

Hillas, Fleming, 5 *Ordnance Row, Lewisham Road, Greenwich*—Inventor.

Purified animal, vegetable, and fish oils for lubrication and perfumery.

Miller, Taverner John, *Dorset Wharf, Westminster*—Importer and Manufacturer.

Spermaceti oil in its original state, as imported from the South Seas.

Rough spermaceti, when separated by filtration and pressure from the oil.

Filtered spermaceti oil, used for illuminating purposes and for lubricating machinery.

Block of refined spermaceti, the inside being hollow, to exhibit its natural crystallization.

Bust formed of refined spermaceti, a new application of the article.

[The sperm whale, *Physeter macrocephalus*, called also cachalot, is a carnivorous cetacean, living chiefly on cuttlefish, and having its mouth armed with teeth instead of whalebone. It is gregarious, and inhabits the open oceans of both eastern and western hemispheres, ranging between 60° N. L. and 60° S. L., but abundant and pursued chiefly in the region of the line-currents between 7° N. L. and 7° S. L. It grows to a large size, the male to 60 feet in length, the female to half that dimension. The former yields 70 to 90 barrels of sperm-oil, the latter 20 to 30. The spermaceti is contained in cellular cavities, occupying the anterior and upper parts of the unwieldy head; from 200 to 500 gallons of this "head-matter" are yielded by a whale. One-sixth of the entire produce is the usual proportion. This matter is placed in hair bags, submitted to strong pressure, melted, and boiled with a weak solution of potash and in alcohol, then cast into moulds, when it becomes the crystalline substance called spermaceti, which is itself a peculiar species of stearine. *Cetine* is its purified state.—E. F.]

Ewen, James, 17 *Garlick Hill, City*—Manufacturer.

Samples of clarified fats.

Dodge, Mrs. Catherine, *Godalming, Surrey*—Producer.

Silk produced by the silkworm, fed upon the leaves of the white mulberry.

Specimens of the silk manufactured.

Martin, Peter, *St. Peter's Port, Guernsey*—Producer.

Raw silk, the produce of the island of Guernsey, being the first sample obtained by the Guernsey Silk Growers Company, lately established in the island.

Fecula, obtained from the *Arum maculatum* a plant indigenous to Guernsey.

Hands & Leavesley, *Coventry*—Silk Dyers.

Specimens of dyed silks.

BROWN, SHARPS, & Co., *Coventry*—Dyers.

Specimens of silk-colours dyed from thrown silk:—yellow gum; specimens of shade dyeing, many having been dyed seven years and upwards.

HARDCASTLE, JOHN HALL, 36 Old Bond Street—Importer.

Skeins of raw silk, the produce of a filature near Geneva, Switzerland.

[illegible], J. E., 5 Bowles Cottages, Hammersmith—Inventor.

Travelling cap, intended for comfort and for the protection of the head against concussion.

WRIGHT, LEMUEL WELLMAN, 75 Cheapside—Inventor and Manufacturer.

Specimens of China grass (Urtica nivea) as it comes from India (Assam) and China; and in various stages from the raw material, as manufactured in India and China.

Also flax and China grass as prepared in this country, for spinning into yarns for fine purposes. Specimens of broad cloth, in which it is mixed with wool in various proportions. Specimens of various kinds of paper made from China grass.

DONLAN, M. J. J., 4 St. Peter's Square, Hammersmith—Inventor.

The seeds of flax and hemp chemically prepared, by which their germinating powers are said to be augmented.

Flax straw, produced from prepared seed, and flax straw produced from seed not prepared, sown on the same day, and on the same land; also samples of flax in different stages of preparation, produced from unsteeped flax straw.

Samples of the ligneous or woody particle from the flax straw; these, when mixed with other ingredients, are used for the feeding and fattening of cattle.

Samples of sail-cloth, produced from unsteeped flax straw. Sail-cloths produced by these processes are said to have been used during five years without being affected with mildew, heating, or premature decay.

Samples of the Phormium tenax, or New Zealand flax, in different stages of preparation, and sail-cloth manufactured from the same.

[The Phormium tenax, or New Zealand flax, is a plant of very different nature from the common flax (Linum usitatissimum). The former is an endogen the latter an exogen. The New Zealand flax is a liliaceous plant.—E. F.]

Samples of fine textures, threads, &c., produced from unsteeped flax straw, brought into a similar state to cotton incorporated with German wool; and also specimens of similar manufacture, produced from the Phormium tenax, or New Zealand flax plant.

The above specimens are said to have been produced by new and peculiar processes.

GILMAN, EDWARD, *Twickenham*—[illegible]
Tao Nui, a New Zealand Chi[illegible]

Specimens of the most useful of the New [illegible]

Gum of the Kawri tree (*Dammara Austr*[illegible] a good varnish can be made from this s[illegible]

Bark of the Hinau tree (*Dicera Dent*[illegible] New Zealanders to prepare the flax for [illegible]

Flax (*Phormium tenax*), [illegible] in a strong decoction of th[illegible]

Flax dyed black, by k[illegible] from a freshwater river.

Shrimp net (*Kotata*)[illegible] pulp of the leaf not re[illegible]

Flax partially diseng[illegible] (*Kuka*) used for the pu[illegible]

Flax in the first sta[illegible]

Small cord made fro[illegible] paration.

Flax prepared for weaving, by soaking it for two days in water, [illegible] a smaller [illegible]. [illegible]

[illegible]—Importers and Manufacturers.

Samples of flax grown in the Courtrai district, Belgium; line, sliver-roving, and yarn, from the flax.

Fine cloth, manufactured from [illegible] warp and [illegible] weft.

[The preparation of flax at Courtrai differs in an essential respect from the ordinary method adopted at home. But the bundles, instead of being steeped in stagnant pools, are sunk in the clear waters of the river Lys. It is said that the waters of this stream have a peculiar effect in producing a flax fibre of extraordinary whiteness and purity. The bundles, after having been steeped, are untied and spread out on grass to be dried. On the completion of this process, the flax is again made up into bundles and undergoes its preparation for the market.—R. E.]

Samples of flax from the Lokeren district, Belgium; line, sliver-roving, and yarn, 35 leas to 130 leas, from the flax.

[The total annual production of flax in Belgium amounts, by a recent estimate, to about thirty millions of pounds. Its total value is calculated at about two millions and a half sterling. This flax is of very superior quality, and is principally employed in the manufacture of the finest class of fabrics. Attempts are being now made on a large scale to cultivate this important plant in England and Ireland. Belgium exports about five millions of pounds of flax to England. The flax grown in the Courtrai district is universally considered to be of the finest quality.—R. E.]

Samples of yellow flax, grown by John Warnes, Esq., Trimingham, Norfolk; of blue flax, grown in Yorkshire. Line, sliver-rovings, and yarn, from 30 leas to 200 leas, from the flax.

Piece of brown cloth and piece of bleached cloth, 100 warp and 150 weft.

Specimen of Chinese reed.

Samples of China grass (a kind of nettle) in the raw state; softened; prepared for cutting and heckling; half-bleached and full-bleached line from this grass; sliver-roving from full-bleached line; tow; 250 leas spun from full-bleached line; 100 leas from tow; dyed line, yarn, and tow from the same.

Piece of cloth, 200 leas warp and 200 leas weft.

["China grass" is known botanically under the name, *Urtica nivea*. It is extensively imported into this country from Assam, and from China.—R. E.]

CATOR, NELSON, & Co., *Selby*—Manufacturers.

Line stumps, or the raw flax plant with the seed attached, as pulled and dried: grown in Yorkshire.

Flax manufactured from the line stumps, and prepared [illegible] spinners. The seed is taken off the stumps, [illegible] an artificial process, and afterwards broken [illegible] machinery.

LOVELACE, E., *Crewkerne.*

[illegible] seed. [illegible] of seed, 17 bushels per [illegible]

[illegible] Street, Strand

[illegible] British Isles, ap-[illegible] and paper.

[illegible] Wilts—

MARSHALL & Co., *Leeds*—Importers and Manufacturers.

Head of Chinese grass, *Urtica nivea* (*Ma*, Chinese name), from Canton province, in China; prepared and dressed fibre, from various samples of sewing thread made from it, and pieces of drill made from yarn spun from the same.

[*Urtica nivea* is the white-leaved nettle of China, miscalled a "grass."—E. F.]

New application of machinery to manufacture.

Head of Courtrai flax (*Linum usitatissimum*): dressed line, and various samples of sewing thread made from the same, exhibited for quality and finish.

GATENBY & PASS, *Manchester*—Manufacturers.

Reeds applied for weaving textile fabrics, manufactured by steam power. They are said to improve the appearance of the cloth, and allow coarser yarns to pass through the same reeds than can be effected by the ordinary means.

BARSHAM, JOHN, *Kingston-on-Thames*—Inventor and Manufacturer.

The outer shell or husk of the cocoa nut (*Cocos nucifera*).

Fibre separated from the same by a patent process.

Brushes, manufactured from the fibre, instead of bristles.

Door mat manufactured from the fibre.

The fibre is cheap, and is preferable to bristles for durability.

NIGHTINGALE, WM. & CHARLES, 64 *Wardour Street, Soho*—Importers and Manufacturers.

Bed feathers and downs, mostly used in England: the produce of the country, of Ireland, and of the northern portions of Europe and America.

Horsehair and the hair of other animals, English and American, in various stages of manufacture for the purposes of weaving, stuffing, brush and sieve making, &c.

MORRELL, HENRY, 149 *Fleet Street*—Manufacturer.

Specimens illustrating the manufacture of lead pencils:

Black lead (*plumbago*), exported from Germany and other parts. Specimen of purified lead, and lead cut into plates. Cedar wood from North America, cut into veneer and bottoms and tops for pencils.

1st stage.—Bottoms grooved and machine for grooving.

2nd stage.—Bottoms, showing the plate of lead inserted and tool used for cutting off.

3rd stage.—Tops, and tops glued on to bottoms.

4th stage.—Rounding machine and pencils in stages of rounding to completion.

Paring tool to finish the ends. Specimens of rough and finished ends.

Stamping machine and pencils stamped, &c.

Pencils in various packages and sorts.

Specimens illustrating the manufacture of sealing wax:

1.—The resins. Stick lac, a secretion from trees punctured by an insect (*Coccus lacca*), in the form of a reddish brown resinous substance, having a crystalline fracture, enclosing the insect. Shellac produced from it. Lac dye, exported from the East Indies to England, and again exported into Germany, Russia, &c.

2. The colouring matter.—Mercury. Sulphur. Sulphuret of mercury or vermilion, the colouring matter
wax.
x. Stick of sealing wax moulded,
finished and stamped. Sealing-wax
rious qualities.
the manufacture of wafers :
of wafer, as produced from tongs
being baked in them. Punches
arious sizes, with samples of the

BLYTH, HAMILTON, & BLYTH, 52 *Little Britain, London, and Henry St., Liverpool*—Importers and Manufacturers.

English and Dantzic goose bed feathers, in a raw state, white and grey; and in a dressed and purified state.

English black horse-hair in a curled and manufactured state; and in the raw state.

BARKER, THOMAS, & Co., *Breams Buildings, Chancery Lane*—Inventors and Manufacturers.

"Sweet spirits of turpentine," prepared by a new process, so as to render paint inodorous as soon as dry. Mastic varnish, for paintings, preventing bloom, &c.

Specimens of wood painted and varnished with applications of the same. Several varieties of other essential oils, manufactured and purified by the above process. Hair dyes, essences, extracts, and perfumes.

MANNING, JAMES, 18 *Coles Terrace, Barnsbury Road, Islington*.

Varnish composed of various gums and pure spirits of wine: the materials are put into a glass barrel and made without the aid of fire. Portraits, &c., varnished to show its clearness.

PENNEY, HENRY, 4 *York Place, Baker Street*—Manufacturer.

Colourless linseed oil and copal varnish.

A door on which the varnish is displayed.

MASTERS, ALGERNON, *Tonbridge*—Proprietor.

Four branches of dried hops.

Six samples of the same.

SMITH, BEN. THOS. & CHAS., 12 *Church St., Mile End, New Town*—Manufacturers.

Emerald green.

Chrome yellow, three shades. Ultramarine, three qualities (imported from Nuremberg). Chinese red. Pure blue. Oxalic acid, two qualities. Oxalate of potash. Chromate of potash. Nitrate of lead. Oxymuriate of tin.

Colours of various kinds.

JEWESBURY, H. W., & Co., *Mincing Lane*—Brokers.

Varieties of cochineal from Honduras, Mexico, Teneriffe, Java, and the West Indies.

[Cochineal is an insect, the dried body of which yields the beautiful red dye for which it is valued in commerce and the arts. The insect is obtained in large quantities from Mexico, the British West Indies, the United States, and Guatemala. It is bred with great care, and feeds on the *Cactus cochinellifer*. Upwards of a million pounds were imported ten years since into the United Kingdom, and in every pound are contained not fewer than 70,000 insects! Cochineal, from its resemblance to seed, was formerly considered to be really a vegetable product. In the cactus stove at Kew the insect may be seen alive feeding upon the cactus of its native habitat.—R. E.]

Varieties of lac dye from Calcutta.

["Lac-dye" is a term commercially applied to a colouring matter extracted from stick-lac. The latter is considered to be the resinous secretion of a tree on being punctured by an insect common in many districts of Eastern India. This insect is called *Coccus lacca*, and is found in enormous numbers in the forests of the mountains on the sides of the Ganges. The insect, when about to deposit the eggs, attaches itself to the branches of trees, and soon becomes enveloped in a layer of gummy matter which hardens on exposure. The insect dies, and her body shrivels into an oval bag containing a minute drop of red fluid. This is extracted from the lac, and, when formed into small masses, becomes the lac-dye of commerce. In 1848, 1,221,308 lbs. were imported into the United Kingdom.—R. E.]

Smith & Son, 12 *Church Street, Mile End New Town.*

Lichens from which archil and cudbear can be produced by steeping them in prepared ammoniacal solutions, so that the orcine they contain may, by combination with water, ammonia, and oxygen, develop colouring matter:—

No. 1. Angola Orchilla weed (*Roccella montagnei*), from Angola, coast of Africa. 2. Thick Lima Orchilla weed (*R. tinctoria*), from Lima, South America. 3. Lima Orchilla weed (*R. fuciforinis*) from Lima, South America. 4. Canary Orchilla weed (*R. tinctoria*), from the Canary Islands. 5. Canary rock moss (*Parmelia pertater*), from the Canary Islands. Pustulatus moss (*Gyrophora pustulata*), from Norway.

Eight samples of archil and two cudbear, all made from Angola lichen, and used for dyeing and printing woollen, silk, cotton, mixed fabrics, and leather, all shades of crimson, violet, blue, and chocolate; used also in making stone blue and lake pigments.

Samples Nos. 8, 9, and 10. Blue, violet, and red archil weed and liquor, as taken from steeping backs, used for dyeing leather and silk. 11 and 12. Red and purple archil liquor, for printers' use. 13. Extract of red archil, for printers' use. 14 and 15. Red and blue archil paste, for dyeing wool and silk. 16 and 17. Cudbear, of two qualities, for dyeing wool and silk.

Specimens of woollens, silks, velvets, cottons, mixed fabrics and leathers, dyed and printed with archil and cudbear, also of stone blue and lake made with archil.

[Lichens are flowerless plants of very low organization, living on air and growing usually on the ground, or on the surface of rocks and trees, in the form of crusts or branching leathery expansions. Many kinds of lichens are available for dyeing. The species of *Roccella* are most useful, but various kinds of *Lecanora* (as *L. perella*, which is the Perelle d'Auvergne, and *L. tartarea*, the cudbear), *Variolaria*, *Urceolaria*, *Isidium*, *Lepraria*, *Parmelia*, *Sticta*, *Solorina*, *Gyrophora*, *Usnea*, *Evernia*, *Alectoria*, *Ramalina*, and *Cenomyce*, many of which are not at present used, would produce colouring matter.—E. F.]

Covey, Charles, 60 *Back Lane, Dublin.*

Samples of Irish manufacture in starch, indigo blues, vegetable gums, and blacking.

Robinson, James, & Co., *Huddersfield*—Inventors and Manufacturers.

Archill paste and cudbear, patent process. Liquid archill for dyeing and printing.

Samples of worsted yarn dyed in best cudbear.

Turner, T., *Crewkerne*—Producer.

Flax, prepared for the manufacturer, grown at Clapton, near Crewkerne. Flax seed.

Bruce, G., 52 *Nelson Street, Liverpool*—Inventor.

Black varnish, for painting and preserving wood and iron-work, either for land or marine purposes. Blue-coloured composition for covering wood or iron, with or without a thin priming of paint. Red composition for the use of agriculturists, machinists, engineers, ship and steamboat builders. Green and stone-coloured composition, applicable to general purposes. Spirit varnish for wood-work.

Long & Reynolds, *Hackney*—Manufacturers.

Carthamus Tinctorius (Indicus), safflower. The colouring matter shown in the liquid and dry state. Used for the purposes of dyeing silk, cotton, &c. Specimens of its effects on those materials.

[The colouring matter yielded by this plant is obtained exclusively from the flowers. It is of a beautiful pink colour, and is employed by dyers to produce the peculiar colour called *ponceau*. It does not, however, bear exposure to light well. Safflower is also employed in the preparation of the most costly descriptions of rouge. About 6,000 cwt. are imported annually into Britain, the greater part from the East Indies.—R. E.]

Burch, William, *Sewardstone Mill, Woodford, Essex*—Manufacturer.

A series of substances and combinations used in the art of dyeing; showing, in various states, the woods, roots, flowers, metals, &c., from which dyeing colours are obtained, with aqueous decoctions and dried extracts. Various acids, and solutions of metals in acids; dyeing precipitates caused by the action of various metallic solutions on vegetable colouring matters; and samples of the general effect of the colouring matters on cotton, silk, and wool.

Samples of London skein silk, woollen, and cotton dyeing, in colours and shades.

Samples of cotton, dressed as hard silk, and of fast cotton dyeing for Lisle thread gloves. The woollen dyes by P. J. Chabot, of Spitalfields; the silk dyes, by Reynolds & Son, Temple Street, Hackney Road (for further specimens by the above dyers, see Class 18).

Opaque or precipitant colours used in oil painting and printing, and as water-colours on paper, book muslin, &c.

An illustration of the art of block printing.

Various gums and substances used in dyeing, printing, painting, dressing, &c., and in the preparation of colouring matters.

Moore, John, *Littlecott Farm, Pewsey, Wilts*—Proprietor.

Southdown ewe (stuffed), bred by the exhibitor, seven years old, but never shorn. Length of the wool 25 inches, weight 36lbs.

Henderson, Richard, *Wooler, Northumberland*—Producer.

Fleeces of cheviot wool, grown at an elevation of 2,600 feet above sea level.

Rebow, J. G., *Wivenhoe Park, near Colchester*—Producer.

South-down sheep's wool.

Millner, Robert, *Dublin*—Proprietor.

Fleeces, long wool, wether and ewe, and male and female hoggets; grown in the counties Meath and Galway. Fleeces, long and short wool, hogget, wether and ewe, mountain grown in the county Wicklow.

Mannings, George, *Wedhampton, near Devizes*—Manufacturer.

Diamond matching wool, for combing; and diamond clothing wool, from Southdown fleeces, the produce of the county of Wilts.

Sands, Wm., & Co., *Mortimer Street, Leeds.*

Specimens of "burry" wool in the original state, with specimens of the same cleaned by machinery.

[By "burry" wool is meant, in the language of commerce, wool containing a quantity of "burs" or thorny particles derived probably from the spinous and other thorn-bearing plants of Australia. These it is necessary to remove previous to the preparation of the wool for textile purposes, and by ingenious machinery this is successfully accomplished.—G. T.]

Motley, Thomas, *Leeds*—Proprietor.

Wool, from Sydney, New South Wales.

Preller, C. A., 31 *Abchurch Lane*—Patentee and Manufacturer.

English wether and hog wool.

Mohair and fine Australian wool, in the raw state as imported; washed; and carded and balled.

Tops, being the long fibres in slivers, to be spun into yarn for the manufacture of worsted stuffs, shawls, and hosiery.

Noils, being the shorter fibres used by blanket and cloth manufacturers.

Yarn, No. 70, spun from the Australian wool (commonly called Botany) tops. The peculiar process of combing by which the above tops have been manufactured is patented.

[By the ordinary process the combs are heated to a high temperature, and oil is applied to the wool before being drawn out in the silver. On the present plan the heat employed is not so great, but more equable, and the use of oil can be dispensed with. The tops are thus preserved clean and white, and better suited therefore for all fine fabrics. The specimens now exhibited are produced without oil.—G. T.]

Good, Floodman, & Co., *Hull*—Importers.

White Iceland wool.

Lippert, David, 66 *Albion Street, Leeds*—Importer.

Fleeces of German wool.

[Wool is a kind of hair, characterised by an imbricated scaly surface, when viewed under the microscope, on which depends its remarkable felting property and its consequent value in manufacture.

Most quadrupeds possess the woolly variety of hair as an under-clothing, but in a small proportion, and hidden by the smooth exterior coarser kind of hair. In the wild sheep (*Ovis ammon* and *Ovis musimon*) the woolly variety is developed in excess; and in the domesticated varieties the fleece has become improved by care and breeding until its original coarse character has disappeared.—R. O.]

Armitage Brothers, *Huddersfield*—Importers and Manufacturers.

Woaded black elephant beavers, 55 inches wide, great weight, 46 and 44 ounces to the yard, manufactured entirely from Port Phillip wool.

Albert check, requiring no lining for the coats, one side being a plain colour, the other checked.

Albert cloth, the two sides being different colours.

"Exhibition" cloths, 56 inches wide, weighing only twelve ounces to the yard.

Scoured Sydney skin wool, grown in New South Wales, and washed by J. T. Armitage and Co., of Sydney.

Horan, Henry—Manufacturer.

Prepared Greenland whalebone of different colours, for covering whip handles, walking sticks, and telescopes, and various other purposes, with portions of black and white whalebone as cut from the palate.

[The whalebone or *Baleen*, as it has been called, consists of numerous parallel laminæ, descending perpendicularly from the palate of the *Balæna mysticetus*. Its object, in the economy of the animal, is to form an efficient strainer for its food, which is taken in with the water; and the latter, when the mouth is partially closed, is expelled, leaving the small crustacea and other animals, which constitute the nourishment of the whales, entangled, as it were, in the laminæ of whalebone. Although all the species of *Balæna* possess this substance, it is furnished in the largest quantities and of the finest quality by the *Balæna mysticetus*, which is the object of incessant and eager pursuit, not only for the value of this substance, but for the immense supply of oil which is obtained from the thick layer of blubber or cutaneous fat in which the body is enveloped. The length of the largest pieces of baleen in a whale 60 feet long is frequently as much as 12 feet; and the laminæ are ranged in two series, each containing about 300 in number.—T. B.]

Puckridge, Frederick, 5 *and* 6 *Kingsland Place*—Manufacturer.

Goldbeater's skin. The raw material, or skin of the gut of oxen. The material in its various conditions, as used for other purposes. The raw material manufactured into goldbeater's skin. Mould of skins, as used in France and Belgium.

[Goldbeater's skin is a membrane separated from animal intestine, attenuated by beating with a hammer, and subsequently prepared so as to resist putrefaction.]

Tebbitt, W., 4 *North Crescent, Bedford Square*—Manufacturer.

Highly ornamented box, calculated to contain four packs of playing cards, manufactured entirely from the two shells known in commerce as the mother-o'-pearl and the New Zealand green-ear; surrounded by an elegant specimen of pierced work, intended as a border for the cover of a drawing-room table book; the cover to be of blue velvet.

[The mother-of-pearl shell is a bivalve of the genus *Avicula*. Several species are used in commerce. The "New Zealand green-ear" is a univalve of the genus *Haliotis*, of which a kind lives in the seas of the Channel Islands, and is used also for the purposes of inlaying.—E. F.]

Lady's visiting card-case; subject, Belisarius.

Taper candlestick; shoe-slip; door-handle; paper-knives; umbrella-hooks; and a ten-inch rule.

The whole made by hand, and wrought exclusively by English workmen.

Abbott & Wright, *Needham Market, Suffolk*—Manufacturers.

Two cakes of crown glue, manufactured from the hides and feet of cattle.

Rea, Edward, 117 *Wardour Street*—Manufacturer.

Lac insects, or *coccus lacca*; lac stick, Siam and Bengal. Products—Seed lac, orange and ruby; shell lac, orange and ruby, lump and button. Lac lake and lac dye, shell lac, lacquers, &c. Polish, varnishes, sealing wax, &c.; white lac, lac wax, yellow and white. Gum elemi; thus, or frankincense; sandrac; mastic, and varnishes. Dragon's blood, grass tree gum, gum kauri, or Australian copal, gum animi; copal; damur; rosin, rough turpentine, Canada balsam, varnish resin, oil varnish, colourless paper varnish, resin varnish, &c.; purified rough turpentine, and spirits of turpentine, varnish, &c.

[Gum elemi and frankincense are furnished by plants of the order *Amyrideæ*, a family allied to the orange tribe; they are tropical.

Gum sandrac, or sandarack, is the product of a north African tree allied to the juniper, probably the *Calitris quadrivalvis*.

Mastich is derived from species of pistachia, natives of the Mediterranean region; they belong to the cashew-nut tribe (*Anacardiaciæ*), a family furnishing many varnishes.

Dragon's blood is produced by the *Dracæna draco*, a liliaceous plant; the *Callitris draco*, a palm; and the *Pterocarpus Draco*, a sandlewood tree, of the pea tribe; from the wood of the first and last named, and from the fruit of the second; they are all tropical.

Grass tree gum is from *Xanthorrea*, an Australian plant of the lily tribe. Gum animi is from the *Hymenæa cour-*

baril, and copal from other tropical species of the same genus, belonging to the pea tribe.

The balsams and turpentines are resinous secretions from trees of the pine tribe. Canada balsam is from the *Abies balsamea*, or balm of Gilead fir. Damur is from *Dammara*, an Australian pine.—E. F.]

SIMPSON, HUMPHREY, & VICKERS, 23 *Little Britain*—Importers and Manufacturers.

Various specimens of isinglass, cut and uncut.

Isinglass is the swimming bladder of sturgeons caught in the Caspian and Aral seas, and in all large rivers in Siberia; an inferior kind is also taken from fish found in the rivers of South America, in the Demerara and Berbice rivers, and in the East Indies. Formerly isinglass was torn up by hand, or cut with scissors; it is now rolled and cut by machinery.

DAWSON & MORRIS, 96 *Fenchurch Street*—Importers and Manufacturers.

Russian and Brazil isinglass.

SWINBORNE, T. C. & G., & Co., *Coggeshall, and* 1 *Great Tower Street, London*—Manufacturers.

Refined isinglass and gelatines.
Clarifying isinglass and gelatines.
Glues, and manufacturer's gelatines.

WATT, W., & SON, *Dumfries, Scotland*—Manufacturers.

Glue made from pieces of hides and skins, principally used by cabinet-makers and joiners.

NIMMO, THOMAS, & Co., *Linlithgow, Scotland*—Manufacturers.

Specimens of glue:—Strong, for the use of joiners, &c.; refined, for paper-makers, &c.; and extra-refined gelatine.

NEUBER, WILLIAM HENRY, 549 *New Oxford Street*—Inventor.

Registered placard holder.
Samples of liquid glue; and water varnish.
Glass and china articles mended with the liquid glue.
Specimens of drawings and paper-hangings varnished with the water varnish.

DUFAVILLE, W., *Broughton House, Islington.*

Culinary articles: wrapped in gelatine, &c.

CURTIS, BROTHERS & Co., 19 *Coleman Street*—Factors.

Substances used for tanning leather: oak bark (*Quercus pedunculata* and *sessiliflora?*), English tree, in the rough, cleaned, chopped, and ground; coppice in the rough, chopped and ground; Flemish tree and coppice, cleaned and chopped; Dutch tree, cleaned and chopped. Larch bark (*Larix europæa*), Scotch, in the rough and ground. Mimosa bark (*Acacia*), New South Wales, in the rough and ground. Babool bark (*Acacia arabica*), Calcutta. Cork tree bark (*Quercus Suber*), Larache and Rabat. Hemlock spruce (*Abies canadensis*), United States, in the rough and ground. Sumach (*Rhus coriaria*), Sicily. Valonia (*Quercus ægilops*), Smyrna. Valonia (*Camata*), Dragomestra, Morea. Divi-divi (*Cæsalpinia coriaria*), Maracaibo, Rio de la Hache, Savanilla. Myrobalans (*Terminalia*), Calcutta. Terra Japonica (*Nauclea Gambir*), Singapore, in import package, and loose. Cutch (*Acacia Catechu*), Pegu, in import package and loose.

[The active principle for which all these articles are valued in the process of tanning leather is *tannin*, or *tannic acid*. It exists in greater or smaller proportions in each vegetable product named, being found principally in the bark. Except for the purposes of chemistry and medicine, tannin is not extracted from these substances, which are consequently employed, in a more or less comminuted state, in the conversion of the gelatine of the hides, &c., into tannate of gelatine, or leather.—R. E.]

FRENCH, BEAL, 51 *Crutched Friars*—Importer and Manufacturer.

Cork, raw material; cork, manufactured by hand.

[Cork is the exterior bark of *Quercus suber*, a species of oak native, cultivated in Spain, Portugal, and the south of France. A tree is ready for barking when it reaches 15 years in age, and between that and 30 years may be barked several times.—E. F.]

HOLT, EDWARD, 24 *White Rock Place, Hastings*—Inventor and Manufacturer.

Mosses, arranged in the form of a vase, collected from various places in East Sussex, with a description of the uses of the plants.

Sea-weeds, zoophytes and corallines, found on the rocks and coast of Hastings and St. Leonards, ornamentally displayed, in a gilt frame; the various uses of the plants, for medicinal and other purposes, briefly described.

GROVES, NICHOLAS, 58 *Watling Street, Dublin*—Manufacturer.

Parchment and glue, Irish manufacture.

BEESON, G., *Mile End Road*—Manufacturer.

Continuous tracing paper, upwards of three hundred feet in length, to enable engineers and others to trace out the entire line of railway on one sheet, up to 1,000 feet.

MURRAY, Sir WM. KEITH, Bart., *Dunnottar, Stonehaven*—Proprietor.

Plank of Scotch fir (*Pinus sylvestris.*)
Section of Scotch elm (*Ulmus montana.*)

NELIS, JOHN, *Omagh, County Tyrone, Ireland*—Proprietor.

Pearls, with specimen of the shells in which they are formed; found in the deepest parts of the river Strule (fresh water), at the town of Omagh, county Tyrone.

[The shell fish from which these specimens of native pearl are derived is the *Unio margaritifera*, and the pearls are second only in quality to those obtained from the true pearl-oyster, *Meleagrina margaritifera.* Pearl consists of concentric layers of membrane and carbonate of lime, and is partially soluble in acid.—E. F.]

EVANS, WILLIAM, *Castle Street, Swansea*—Inventor.

Piece of Welsh oak, prepared by a peculiar process, as a substitute for fancy wood.

CHINCHEN, ANN, *Swanage, Dorset.*

Fancy-work in straw plait, manufactured by the hand, at Swanage; and used for making hats, bonnets, and baskets.

STANDISH & NOBLE, *Bagshot*—Importers and Producers.

Cupressus funebris, or weeping cypress, 30 feet in height, from the green-tea country, Wheychow (Hwuychow), in the north of China, where it is used for ornamental planting, and in burial grounds, whence it takes its name. Live plants were first imported into this country in the spring of 1849.

Pieces of polished wood from the same tree.

ROYLE, J. FORBES, M.D., F.R.S., *Acton*—Collector.

A collection of mineral, vegetable, and animal products, useful in the arts, manufactures, and medicine, collected in the bazaars of the Bengal presidency, with some additions, and a few contributions from Drs. Falconer and Stocks.

Booth, John Peter, 80 *Hatton Garden*—Importer.

Feathers from a diving bird (*Aptenodytes patagonica*), a native of islands in the Pacific Ocean; used for ladies' boas, muffs, &c. Georgiana boa, muff, and cuffs, made of the feathers of a diving bird (*Podiceps cristatus*), a native of islands in the Pacific Ocean; lighter than, and as warm as, fur.

Mason, George, *Yately, Hartford Bridge, Hants*—Producer.

Flax, grown and steeped at Yately; scutched at the New County Gaol, at Winchester.

Pursey, Wm. Henry, 14 *Spring Street, Sussex Gardens, Paddington*—Manufacturer.

Flowers used as ornaments for the dinner table, for garnishing meats, &c.; cut out of vegetables.

Lemare, Jane Clara, 11 *Cowley Terrace, North Brixton*—Manufacturer.

Sheets of wax for modelling flowers. The raw material, in three different stages. Also, a small group of flowers, showing the application of the waxen sheets.

Learmouth, Thomas, 40 *Royal Crescent, Notting Hill*—Importer.

Scoured skin merino wool, the growth of Port Phillip, New South Wales.

Stevens, William, 1 *Rock Place, Tottenham Road, Kingsland*—Inventor.

Preserved flowers, retaining their natural form; intended to form cabinet illustrations of botany.

Heal & Son, *Tottenham Court Road*—Importers and Dressers.

Specimens of bed feathers; Irish, English, Russian, Hudson's Bay, and Dantzic, in the raw state, and steamed and dressed.

Specimens of Russian down, in the raw state, and steamed and dressed.

Specimens of Greenland eider-down dressed.

An eider down quilt, composed of a fine satin centre, and surmounted by a border of white satin, richly embroidered with flowers and ornaments. Executed by James Houldsworth and Co., of Manchester.

A quilt of fine Greenland eider down, covered with rich blue and gold brocaded silk, designed and adapted to lay across the foot of a bed.

Jennings, Henry, 8 *Great Tower Street*—Inventor and Producer.

1. Gum-substitute, employed instead of gum Senegal in printing mousseline-de-laine, calico, &c.
2. Oxalic acid, for dyeing and other chemical purposes.
3. Saccharine matter, or sugar, for preparing syrups used for the refining of loaf sugars, and for fermentation, to produce alcohol or vinegar.
4. Alcohol.
5. Vinegar or acetic acid is a new use of universal application.

These various substances are produced by the decomposition of potato-starch, or other amylaceous matter, by means of new and economical chemical process, and in a state of purity hitherto unattainable.

[Oxalic acid is prepared in large quantities for the purposes of commerce, by a process involving some refined chemical principles. It occurs in the juice of the wood-sorrel (*Oxalis acetorella*). It is procured in quantity by acting upon animal and vegetable substances with nitric acid. The elements of sugar, when it is thus treated, undergo the curious metamorphosis of producing an acrid poison, from being been before combined in a wholly innocent form. In chemistry and the arts, this acid is of value, and particularly in that of calico-printing, in the production of the well-known variety of prints called the discharge-style.—R. E.]

Cooney, Charles, 60 *Back Lane, Dublin.*

Samples of Irish manufacture in starch, indigo blues, vegetable gums, and blacking.

Groves, Nicholas, 58 *Watling Street, Dublin*—Manufacturer.

Parchment and glue, of Irish manufacture.

Cheesebrough, William, *Bradford, Yorkshire*—Proprietor.

Specimens, illustrating the average quality of combing wools from each county in England.

Samples of Irish, Scotch, and Welch long wool.

Hadwen, John, & Sons, *Kilroyd Mills, near Halifax.*

Specimens of the process employed in the production of silk in general:—

1. Seeds of the mulberry tree.
2. Eggs of the silk-worm.
3. The cocoon in the state in which the silk-worm leaves it.
4. Cocoons in the brush, showing the knubbs in their rough state.
5. Reeling of the cocoon into the hank.
6. Refuse cocoon made in the reeling.
7. The same in a damp state, and a sample of carded silk.

Durant, Richard, jun., 11 *Copthall Court*—Proprietor.

Samples of raw silk, the produce of the various silk-producing countries, Italy, China, India, Turkey, &c.

Hayes, P., *Widness, Warrington*—Manufacturer.

Rosin in the raw state.

Spirits extracted from rosin, used for making varnish.

Refined rosin oil, for coarse machinery, ships' masts, &c., &c.

Common rosin oil, for tramways, &c.

Pine tallow, manufactured from rosin, for railways.

Pitch.

Rosin acid.

Pine varnish made from rosin, for vessels.

Tod, W., *Clinchfoot, by Langholm*—Producer.

Specimen of compressed peat, giving 8 per cent. more heat than the best coal of equal weight.

Vegetable Kingdom, Sectional Committee on.

Samples of the ordinary flax and hemp of commerce.

French flax; Flemish flax; Dutch flax; Friesland flax; Archangel flax; Riga flax; English flax; Egyptian flax; New Zealand flax.

Petersburg clean hemp; Petersburg half-clean hemp; Riga Rein hemp; Riga Pass hemp; American hemp; Egyptian hemp; brown India hemp; India scum hemp; Manilla hemp; Italian hemp; Jute hemp.

Claussen, Peter, 26 *Gresham Street, London*—Inventor and Patentee.

Samples of flax prepared by the exhibitor's process, intended to show the universal applicability of flax fibre to the purposes of textile manufactures.

The first set of samples are intended to show the various processes resorted to in the preparation of flax into a material capable of being spun alone, or mixed with various proportions of cotton upon any of the ordinary cotton-spinning machines. The samples show, 1st, the flax in the straw as pulled from the ground, cut into appropriate lengths by suitable machinery. 2nd. As it appears after having undergone the first process of saturation in a solution of soda required to remove the glutinous substance adhering to the fibres. 3rd. The fibres as seen after the removal of the "shove," or woody part of the plant. 4th. The flax transformed into a cotton-like substance by the expansive force of carbonic acid gas produced by the action of an acid upon the soda, taken up by the fibres in the previous stage. The 5th, 6th. and 7th shows the same bleached, dried, carded, and ready for spinning. The remaining articles in this series are samples of mule and throstle yarn of various numbers, some of which are composed entirely of flax, and others of various properties of flax and cotton. Both these descriptions of yarns are exhibited, bleached and dyed in various colours for the purpose of showing that flax, prepared upon this process, is capable of receiving the same opaque dye as cotton, and, in the mixed yarns, no difference can be distinguished in point of colour or of shade between the two materials. Samples of grey and bleached, dyed and printed cloth woven from the yarns, prepared as above, are also exhibited. The yarns formed of a mixture of flax and cotton are termed "flax-cotton" yarns.

The second series of samples consists of yarns formed of various proportions of flax and wool called "flax-wool yarns," the flax being prepared, in many respects, in the same manner as when required for spinning on cotton machinery. The mixed woollen and flax yarns were spun on the ordinary woollen machinery. Samples of flannel and of woollen cloths, milled and dyed, woven from these mixed yarns, of various colours.

The third series contains samples of flax prepared for spinning alone or combined with short silk upon the ordinary silk machinery. The flax so prepared is shown, dyed various colours, and possessing, unlike the samples prepared for the cotton machinery, the brilliancy of colour which is peculiar to silk. The yarns formed of equal or other proportions of flax and silk, which are termed "flax-silk yarns," are shown dyed; and, as in the case of the "flax-cotton," no difference of shade or colour is perceptible in the two materials. A quantity of silk, woven from "flax-silk" yarns, is also shown in this series.

In the fourth series, samples illustrative of the exhibitor's mode of preparing flax for spinning upon the ordinary flax machinery, and for its manufacture into linen fabrics.

A fifth series consists of various samples of hemp, jute, and the fibrous substances prepared, either in whole or in part, as above; and samples of cloth woven upon the Chevalier Claussen's circular loom for the purpose of showing the applicability of the invention to articles of hosiery.

The advantages claimed as arising from the process, illustrated in the fourth series for preparing flax for the linen manufactures, are its simplicity, rapidity, certainty, and cheapness. By this process a fibre nearly free from colour is procured, so that the after process of bleaching is greatly facilitated: the fibre is also pure when produced, so that the same weight, or nearly so, of yarn, can be spun from a given weight of fibre; and the loss in bleaching is very small, as it consists only of the removal of accidental impurities received in the process of manufacture.

The three first series of samples are intended to show the applicability of the flax fibre for textile manufactures, other than linen or cambrics. It can also be spun alone, on cotton machinery, by the ordinary cotton process.

It has long been a desideratum with woollen manufacturers of all classes to obtain a material cheaper than wool, possessing the same felting or "milling" properties. Cotton and China grass have not this propety. The flax fibre is said to be stronger than the wool, and to mill equally with it. The sample shown was milled from 54 inches wide (as it fell from the loom) to 28, its present width. To prove its felting properties fully, hats have been made from the fibre mixed with an insignificant portion of rabbits' hair.

1. Flax-seed and flowers (in wax).
2. Flax-straw with the seed-bolls on.
3. Flax-straw rippled or deprived of the seed-bolls.
4. Flax-straw as prepared by the farmer (by the exhibitor's machine). By this operation the straw is freed from the greater portion of the wood, and is reduced to one-third of its original bulk and weight, and the fibre is left uninjured, and in a fitter state for the next process.
5. Flax straw, as above, after having undergone the alkaline part of the process.
6. Flax-straw, as above, after having undergone the acid part of the process.
7. The fibre, as above, unbleached, scutched.
8. Flax-straw prepared, unbleached, and scutched.
9. Flax-straw prepared whole by processes 5 and 6, or not having undergone the breaking process described in No. 4.
10. Flax-straw, prepared and bleached as above, in the straw.
11. Flax, prepared, bleached, and scutched in the straw whole.
12. Flax-straw, prepared, broken by the exhibitor's machine (No. 4) and bleached in the bulk.
13. The same scutched.
14. Flax split according to the exhibitor's natural colour.
15. The same, bleached.
16. Linen yarns spun from fibre prepared by the above processes, *i. e.*, from fibre, natural colour, whole; from the same, split; from fibre, bleached in the straw, whole; from the same split.
17. Linen cloths woven from each of the above-described yarns.

Short Fibre.

18. Flax-straw cut into lengths for producing fibre to spin on cotton machinery, wool or silk, whole.
19. The same, having been partially deprived of its refuse (process No. 4), cut into short lengths.
20. The same, after the alkaline process.
21. The same, after the acid process.
22. The same, fibre split.
23. Flax-fibre, separated from the refuse, unbleached.
24. The same, separated from the refuse, bleached in the straw.
25. The same, unbleached and carded, fit for spinning on cotton machinery.
26. The same, bleached and carded for cotton machinery.
27. The same, in slivers.
28. The same, in rovings.
29. The same, in yarn.

Flax Cotton.

30. Flax-cotton—half cotton and half flax in wool,—as above.
31. The same, slivers.
32. The same, rovings.
33. The same, yarns, mule, and throstle.
34. Cloths, all flax, spun and woven on cotton machinery.
35, The same, flax and cotton, spun and woven on cotton machinery.
36. Flax-cotton yarns, dyed by the ordinary cotton processes, showing that flax fibre takes colour exactly in the same manner as cotton.
37. Flax cloths, dyed and printed.
38. Flax-cotton cloths, dyed and printed.

Flax Silk.

39. Fibre prepared for spinning on silk machinery.
40. Slivers of flax and short silk, mixed in various proportions.
41. Rovings made from such slivers.
42. Yarns made from such rovings.
43. Cloths made from such yarns.
44. Flax fibre (pure) dyed by the ordinary process for dyeing silk, showing the greater brilliancy of the flax when prepared by the patent process.
45. Flax-silk cloths dyed and printed.

Flax Wool.

46. Flax fibre for mixing with wool (carded).

47. Flax and wool mixed together in equal parts.
48. Slubbings from the same.
49. Yarns from such slubbings.
50. Cloths produced from such yarns, woven on the exhibitor's circular loom.
51. Flax and wool mixed for flannels.
52. Yarns produced from the same.
53. Cloth produced from the same.
54. The same dyed.
55. Various samples of cloths produced from flax, flax-cotton, flax-silk, flax-wool, woven on Chevalier Claussen's circular loom, and intended to show the applicability of the invention to hosiery, &c.
56. Various samples of hemp, and other fibrous plants, prepared either in whole, or in part, as above.

Breadalbane, Marquis of, *Taymouth, Aberfeldy, Scotland*—Proprietor and Producer.

Specimens of woollen yarn, made from the wool of the bison.

Mason, George, *Yateley, Hartford Bridge, Hants*—Producer.

Flax, grown, steeped, and scutched at Yateley, Cobham, Surrey, and at the Farnborough Union workhouse, North Hants.

Refuse tow from the above.

Monteiro, Luis Antonio, 13 *Claremont Terrace, Pentonville.*

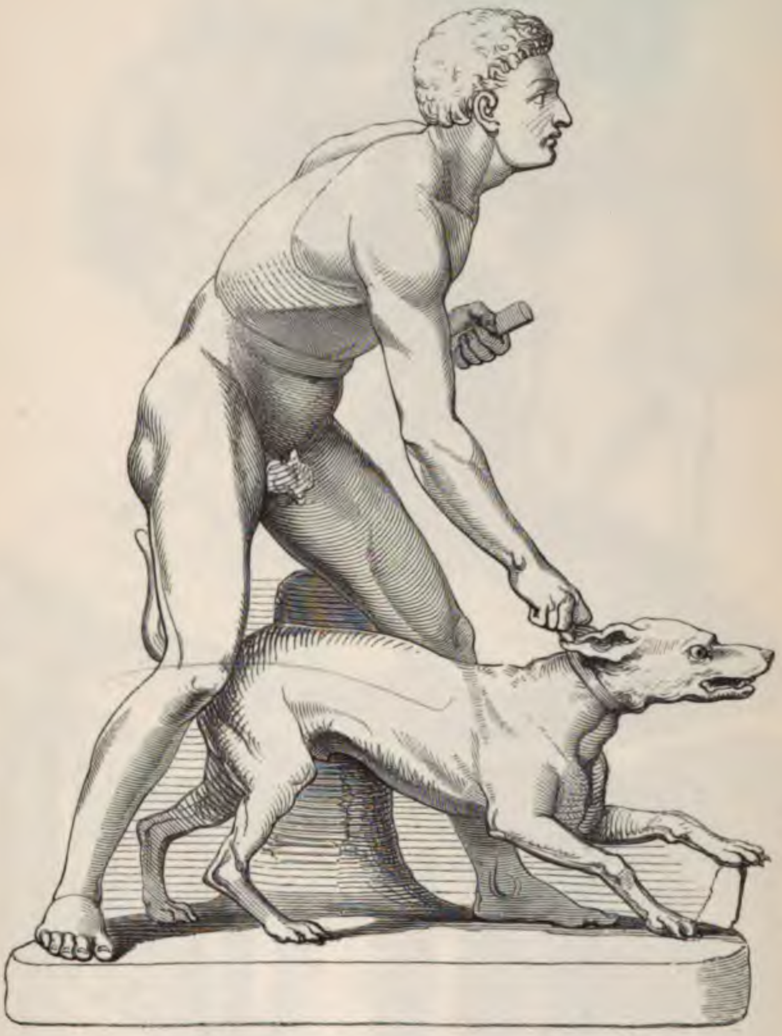
Samples of sweetened chocolate, made of Caraccas cocoa, without any adulteration or farinaceous admixture; of Caraccas and British West India cocoas; and of British West India Islands' cocoa. Chocolate lozenges and confection of Caraccas cocoa, with other ingredients.

Keene, William, 24 *Cornhill*—Proprietor.

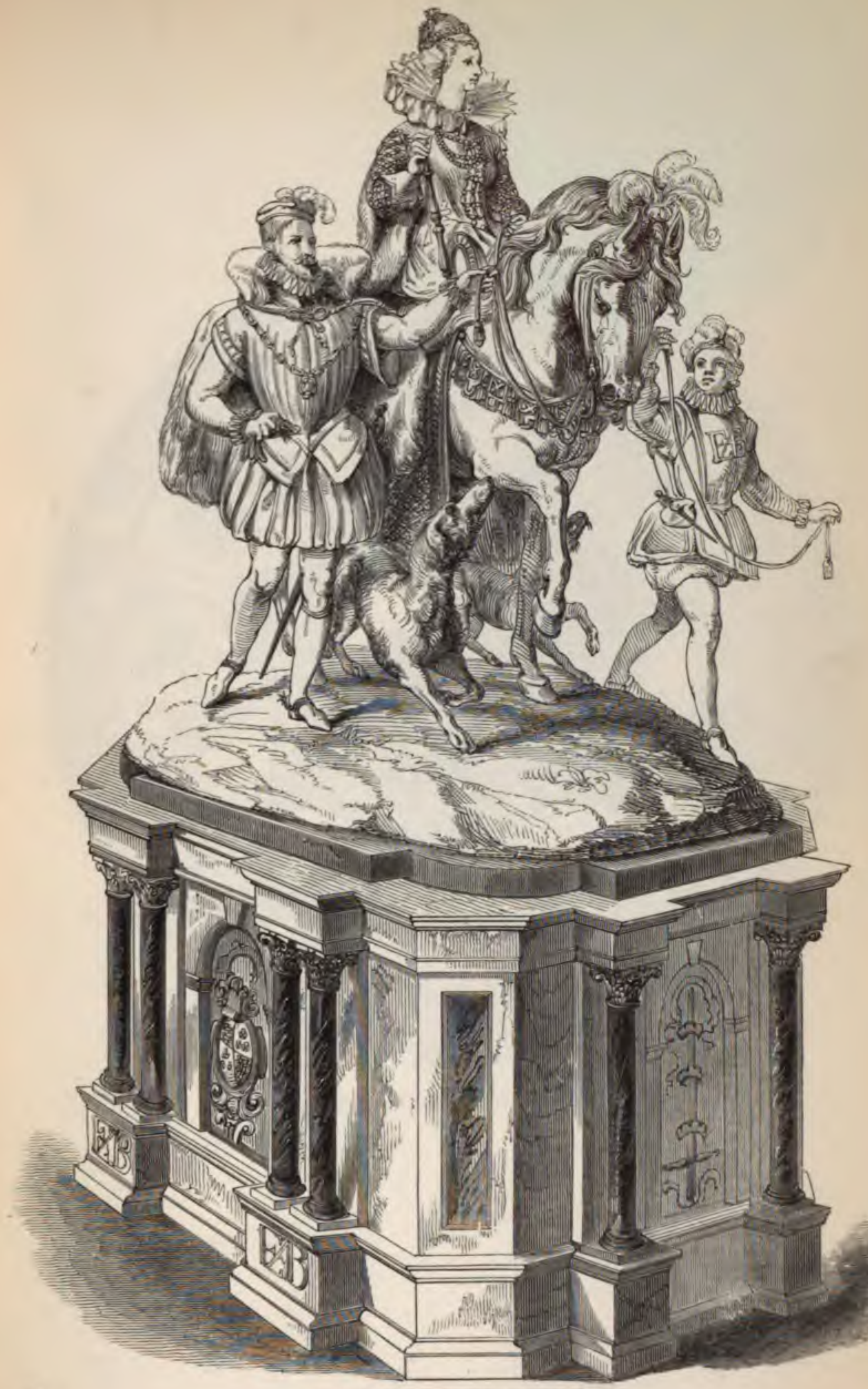
Case containing geological specimens from the Western Pyrenees.

[The Western Pyrenees consist chiefly of cretaceous deposits, with a central range of crystalline and metamorphic rocks. The Bunter sandstein occurs at intervals, and towards Argelles the oolitic series is represented. The triassic rocks occupy the southern or Spanish, and the oolitic and cretaceous the northern or French side of the central ridge—D. T. A.]

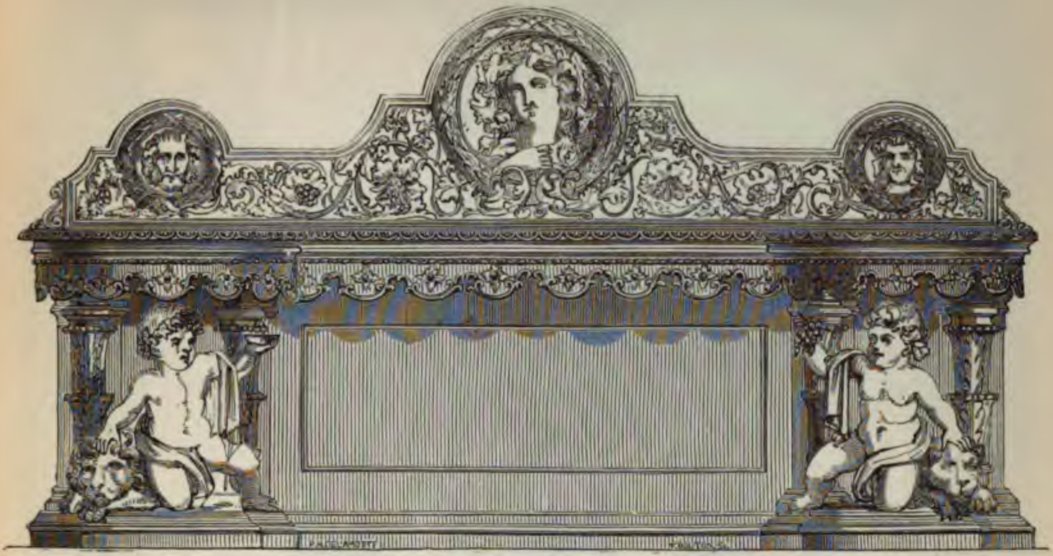
Specimens of the "forty-day maize" grown in England, from new sorts cultivated by the exhibitor in the Pyrenees.



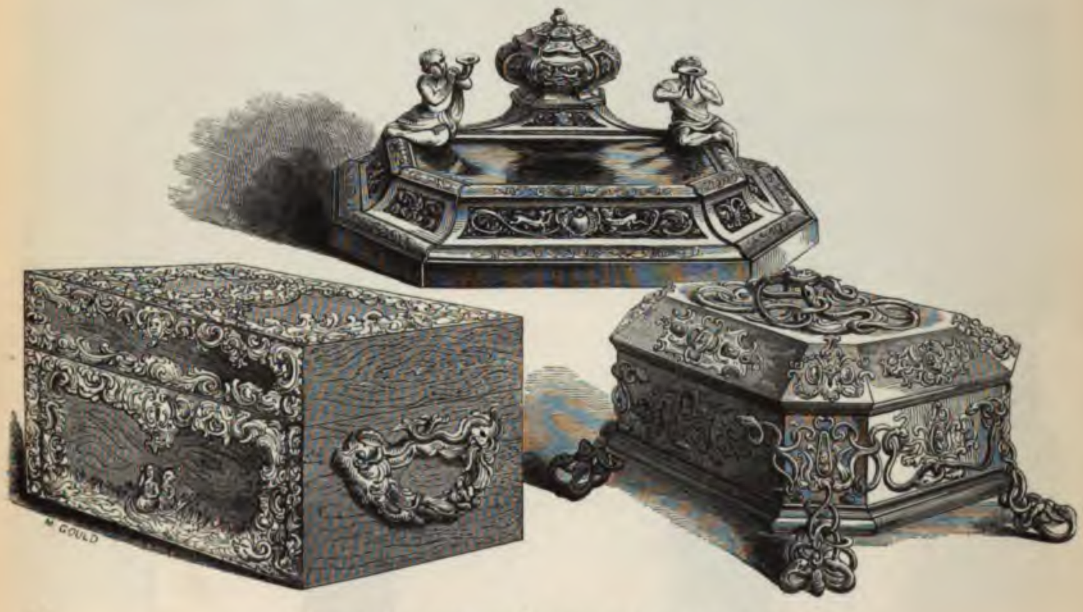
12. GREEK HUNTER, BY JOHN GIBSON. LORD YARBOROUGH.



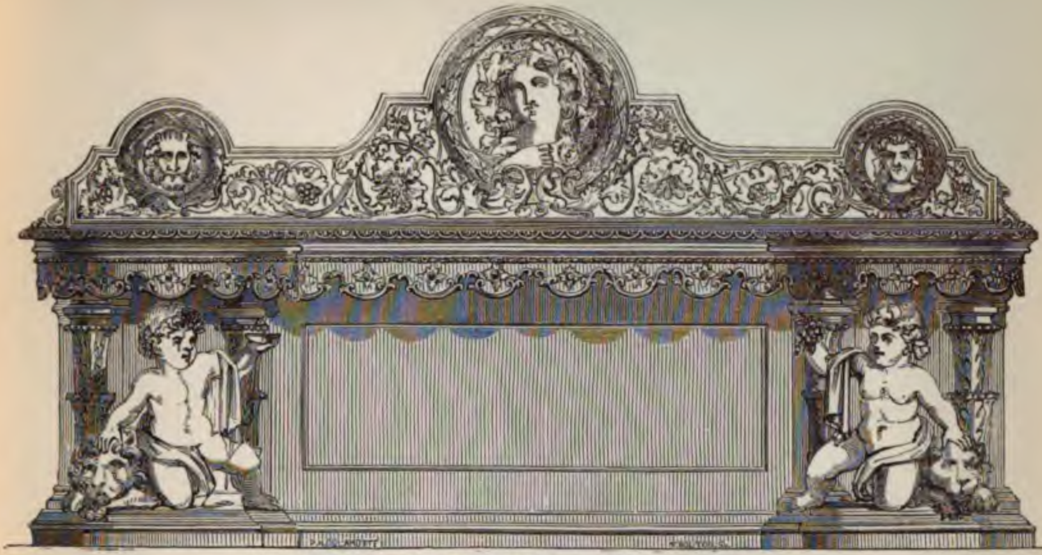
GROUP IN SILVER. MR. HANCOCK.



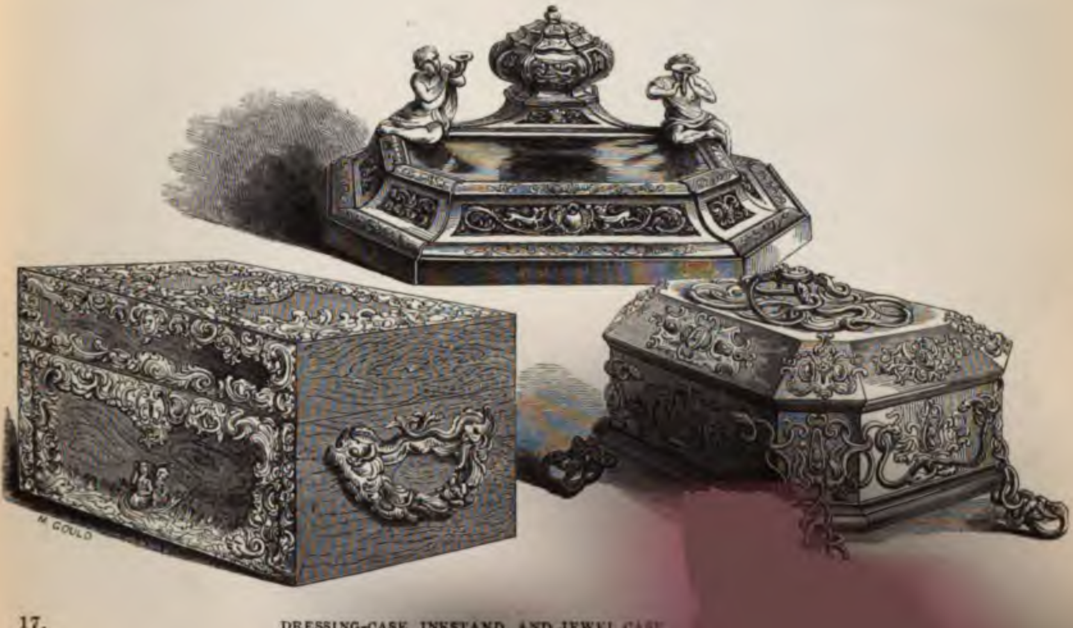
16. CARVED SIDEBOARD. MESSRS. JOHNSTON AND JEANES.



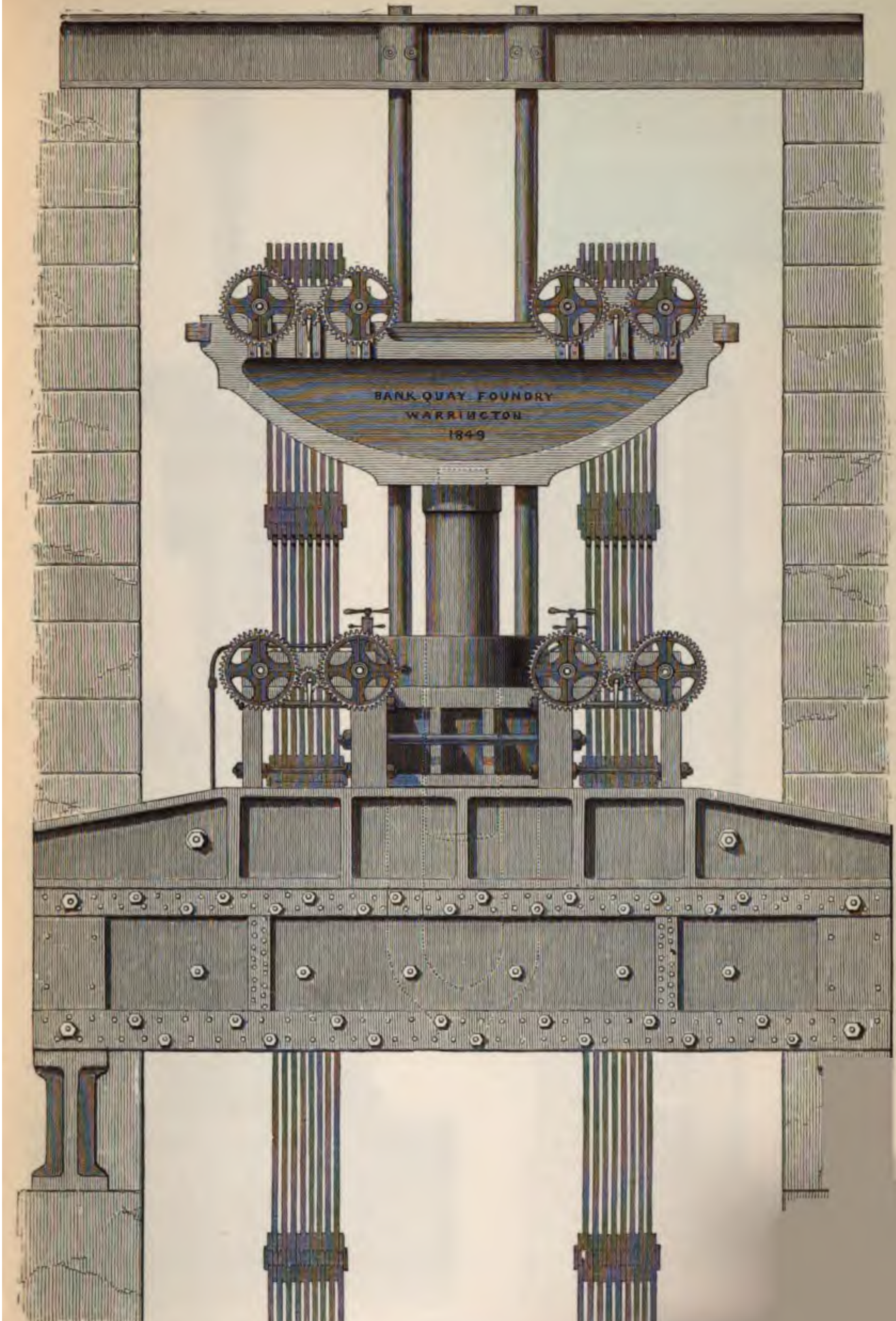
17. DRESSING-CASE, INKSTAND, AND JEWEL CASE. MR. ASPREY.



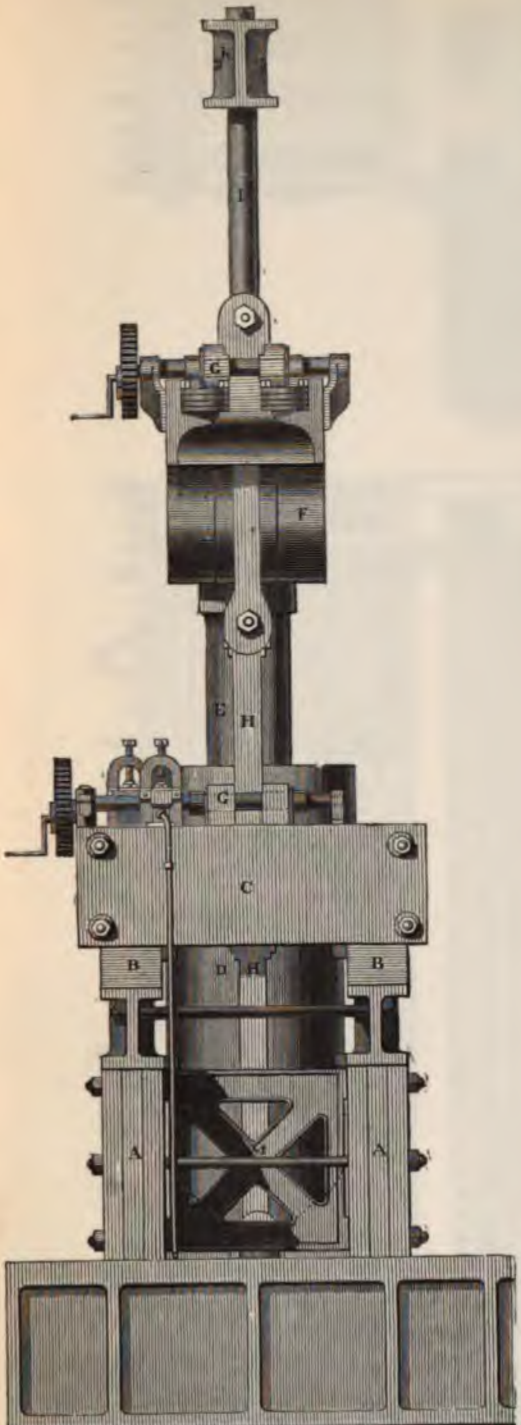
16. CARVED SIDEBOARD. MESSRS. JOHNSTON AND JEANES.



17. DRESSING-CASE, INKSTAND, AND JEWEL CASE.

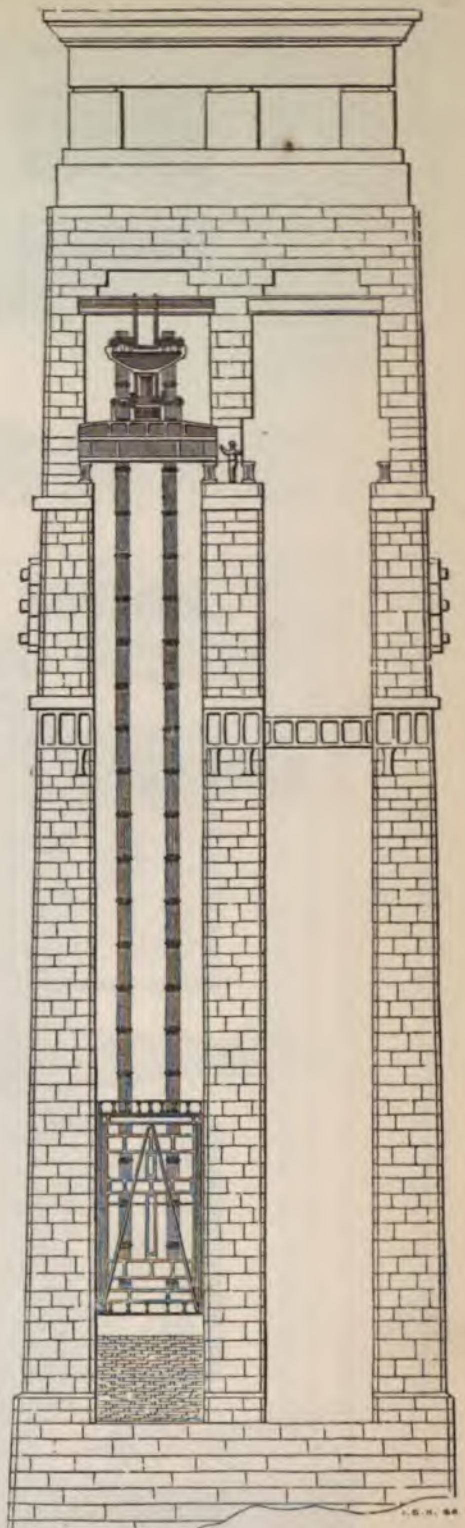


18, I. GREAT HYDRAULIC PRESS EMPLOYED IN RAISING THE BRITANNIA TU



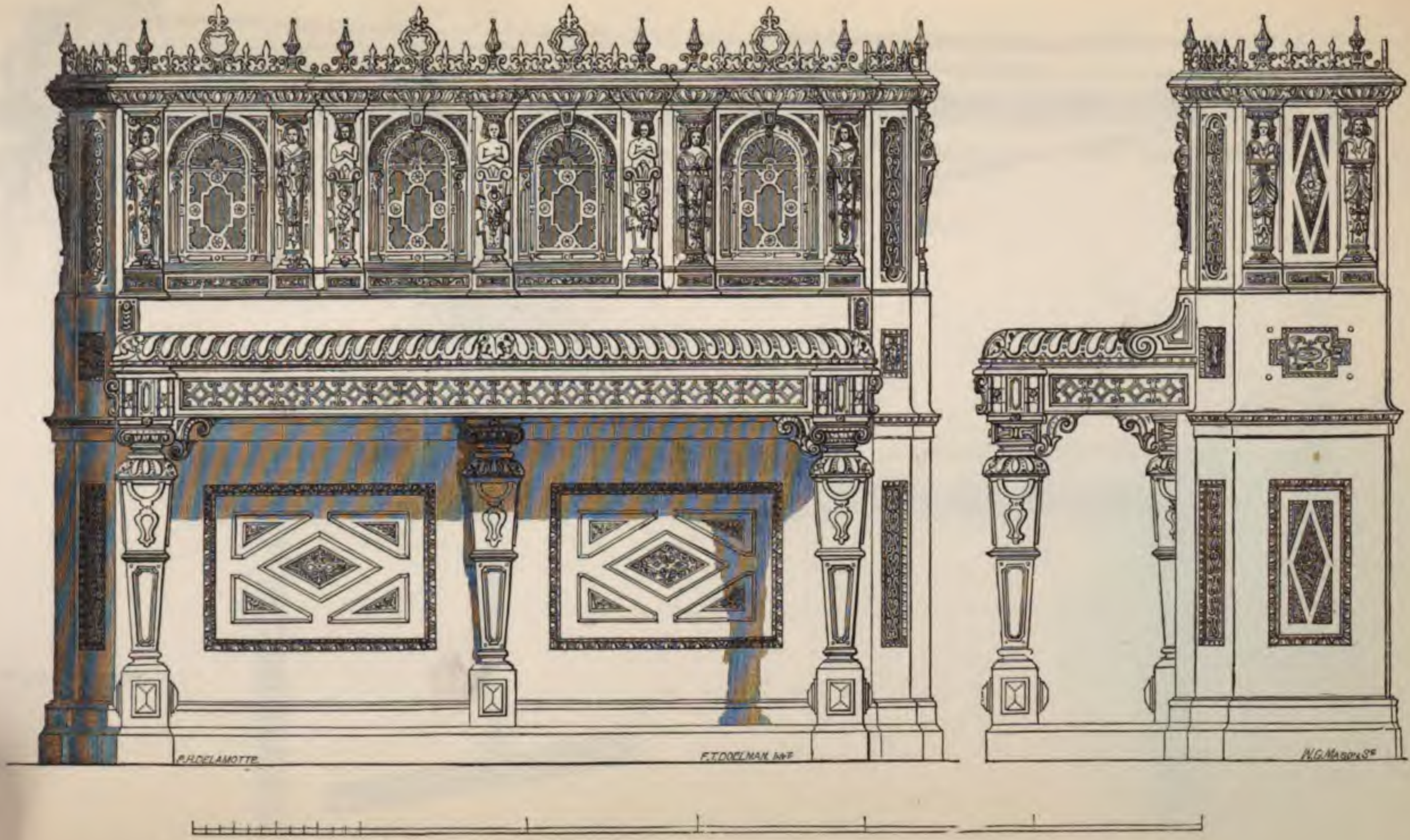
II. THE PRESS SHOWN IN OPERATION—THE TUBE PARTLY LIFTED.

19.



III. END ELEVATION.

20.



ERARD'S ELIZABETHAN NEW PATENT GRAND OBLIQUE PIANO-FORTE.

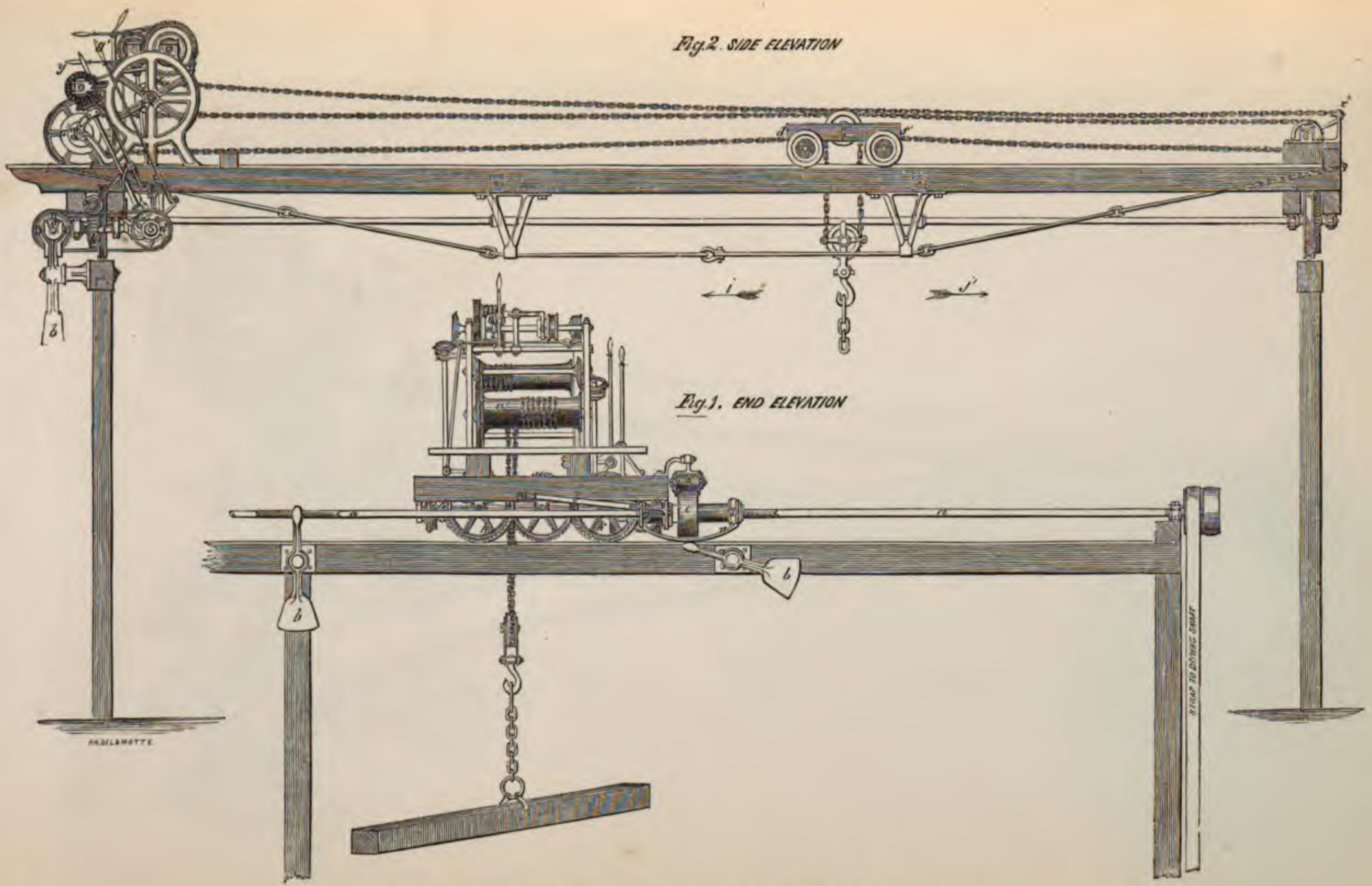
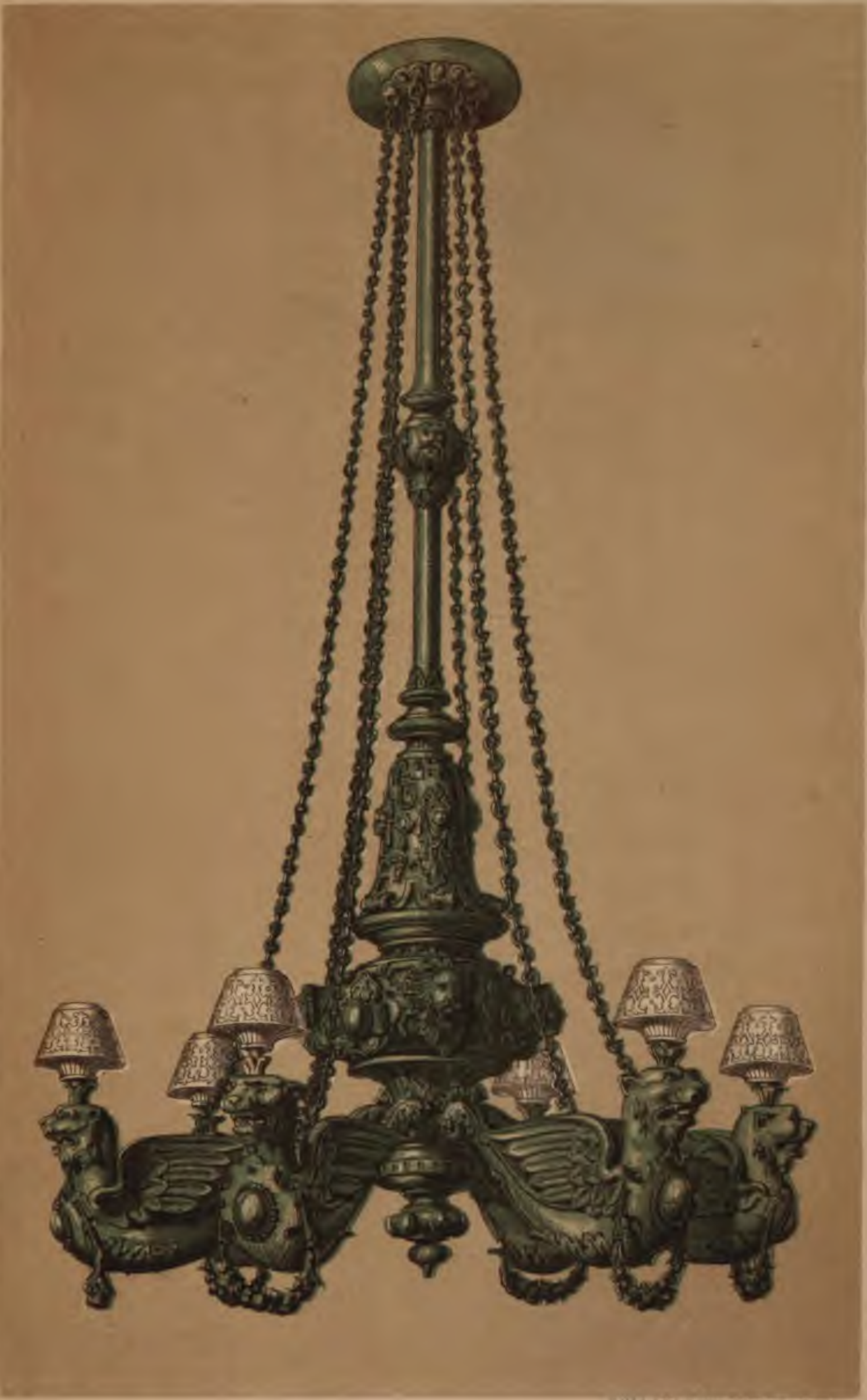


Fig. 2. SIDE ELEVATION

Fig. 1. END ELEVATION

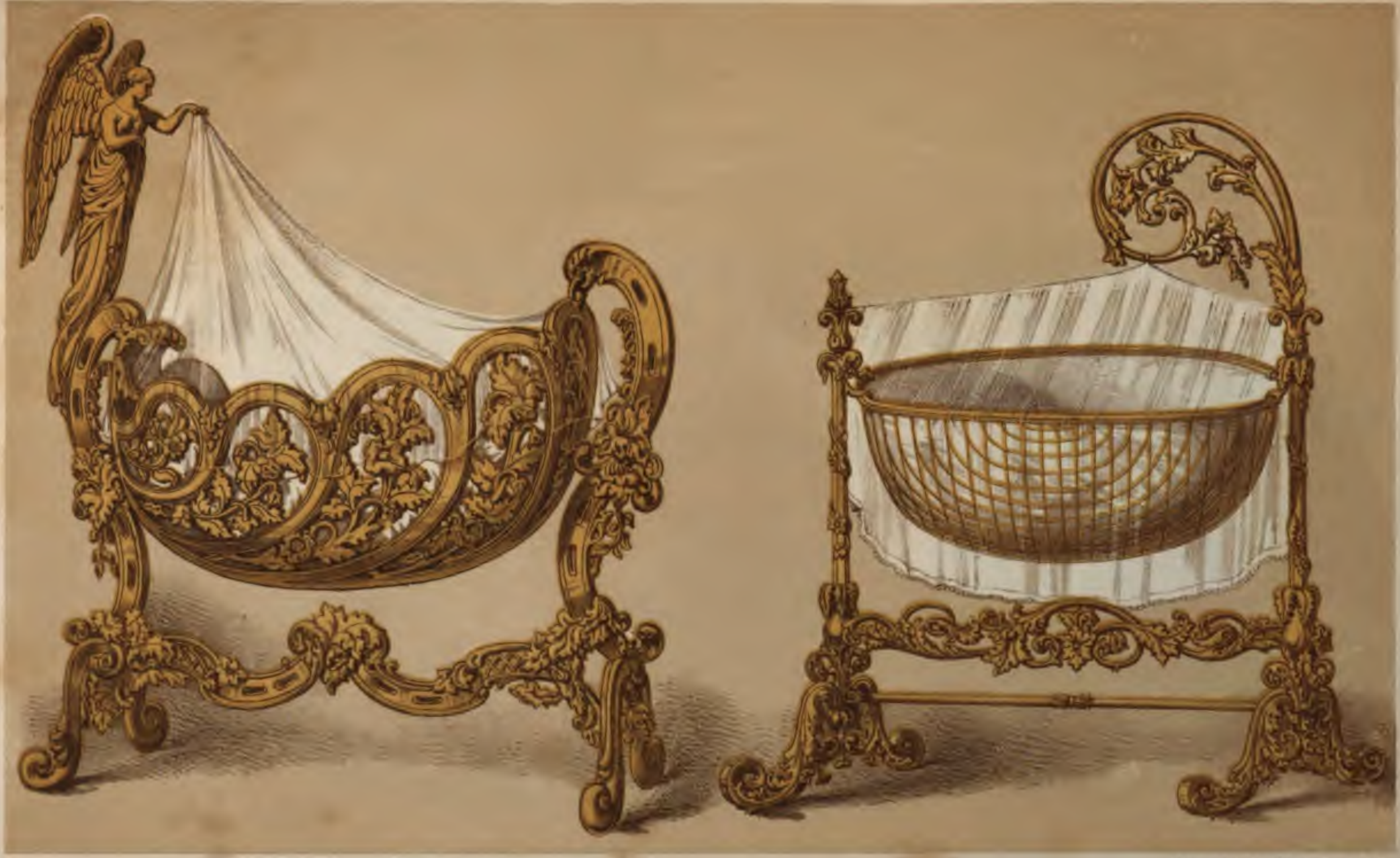
23.

PATENT STEAM TRAVELLING-CRANE. MESSRS. M'NICOL AND CO. LIVERPOOL.



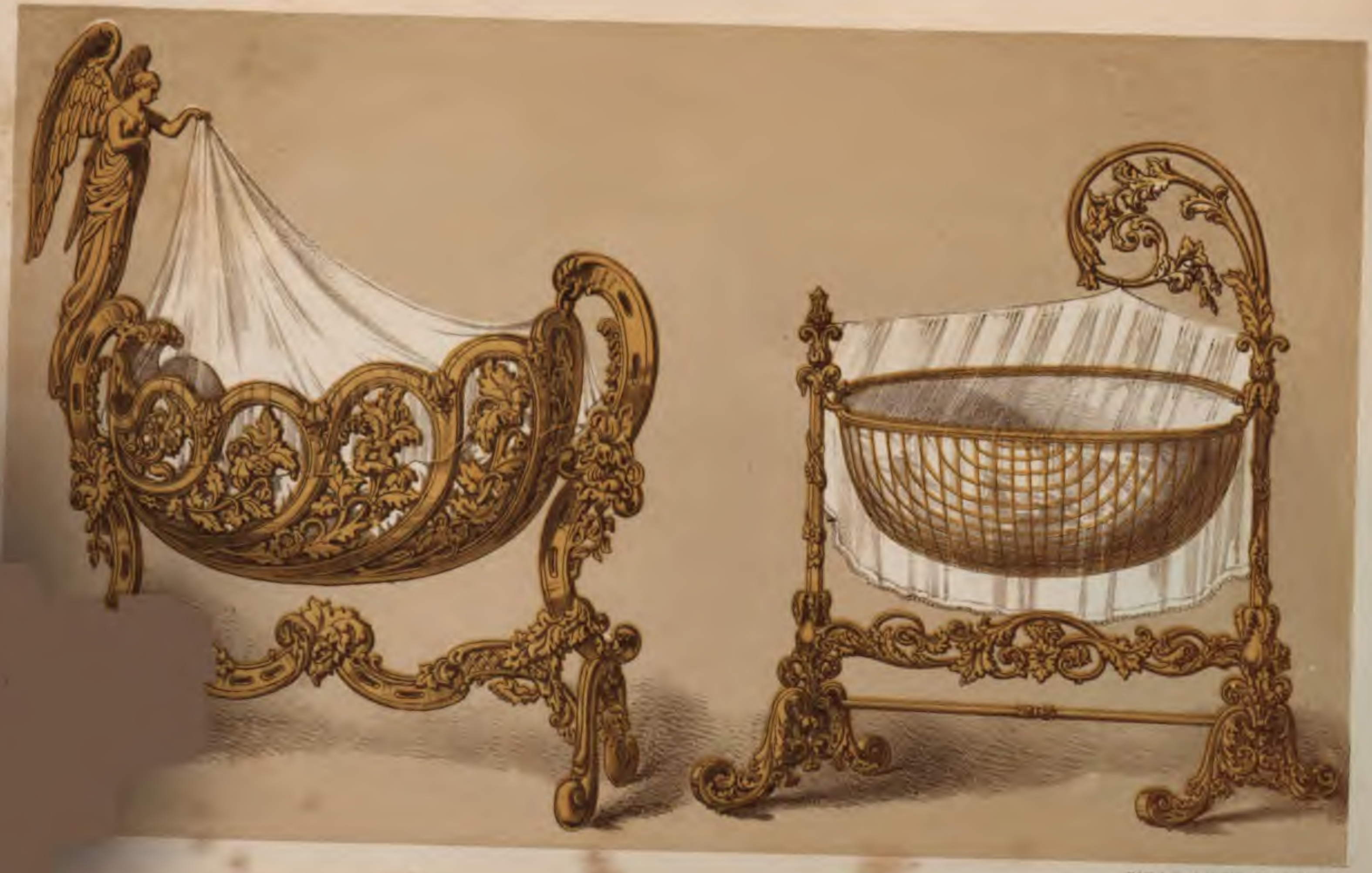
DAY & SON, LITHRS TO THE QUEEN.

R.W WINFIELD, CAMBRIDGE STREET WORKS, BIRMINGHAM



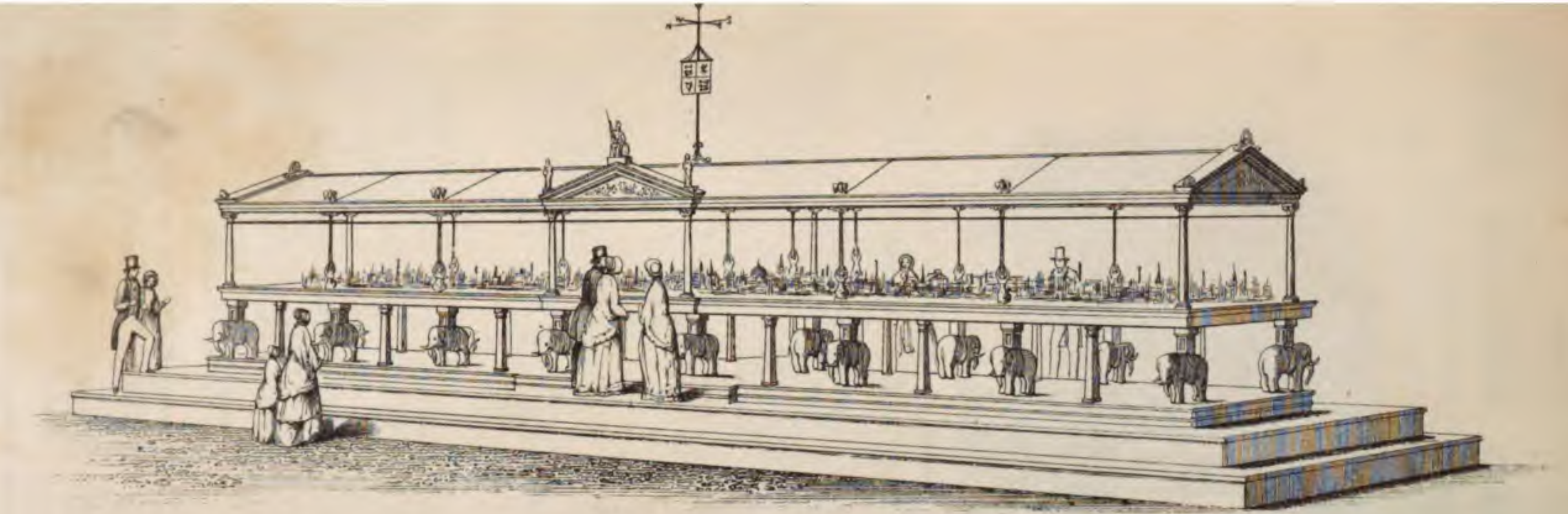
DAY & SON, LITHRS TO THE QUEEN

R. W. WINFIELD, CAMBRIDGE STREET WORKS, BIRMINGHAM



DAY & SON, LITH^{RS} TO THE QUEEN

R W. WINFIELD, CAMBRIDGE STREET WORKS, BIRMINGHAM

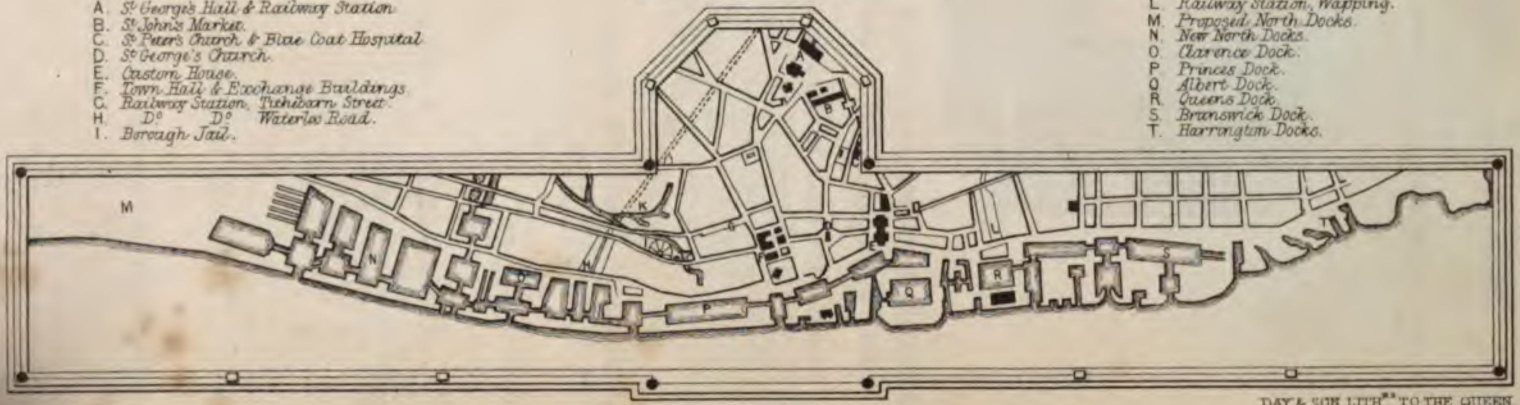


References.

A. St George's Hall & Railway Station.
B. St John's Market.
C. St Peter's Church & Blue Coat Hospital.
D. St George's Church.
E. Custom House.
F. Town Hall & Exchange Buildings.
G. Railway Station, Tithebarn Street.
H. Do Do Waterloo Road.
I. Borough Jail.

Scale of Model 8 Feet _ 1 Mile.

K. Leeds & Liverpool Canal.
L. Railway Station, Wapping.
M. Proposed North Docks.
N. New North Docks.
O. Clarence Dock.
P. Princes Dock.
Q. Albert Dock.
R. Queens Dock.
S. Brunswick Dock.
T. Harrington Docks.



DAY & SON, LITHRS TO THE QUEEN

THIRD SEPTENNIAL BONUS.

CROWN
LIFE ASSURANCE COMPANY,

33, NEW BRIDGE-STREET, BLACKFRIARS, LONDON.

DIRECTORS.

GEORGE H. HOOPER, ESQ., Chairman.
SIR JOHN KIRKLAND, Deputy-Chairman.

JOHN CHAPMAN, ESQ.
CHARLES CHIPPINDALE, ESQ.
JAMES COLQUHOUN, ESQ., LL.D.
B. D. COLVIN, ESQ.
REAR-ADMIRAL DUNDAS, C.B., M.P.
W. H. GÖSCHEN, ESQ.
GEORGE HANKEY, ESQ.
THOMAS HARRISON, ESQ.
JOHN NELSON, ESQ.
OCTAVIUS OMMANNEY, ESQ.
ALEXANDER STEWART, ESQ.
WILLIAM WHITMORE, ESQ.
WILLIAM WILSON, ESQ.

AUDITORS.

J. C. H. COLQUHOUN, ESQ. J. R. GARDINER, ESQ. WALKER PITCAIRN, ESQ.

PHYSICIAN	SIR C. F. FORBES, M.D., K.C.H., 23, Argyll-street.
SURGEON	JOHN SIMON, ESQ., F.R.S., 3, Lancaster-place, Strand.
STANDING COUNSEL	CHARLES ELLIS, ESQ.
SOLICITORS	MESSRS. HALE, BOYS, and AUSTEN.
BANKERS	BANK OF ENGLAND.
ACTUARY	J. M. RAINBOW, ESQ.

On a **THIRD SEPTENNIAL INVESTIGATION** into the affairs of this Company, to the **25th March, 1846,** a BONUS, amounting on the average to **31** per cent. on the Premiums paid for the preceding Seven Years, was assigned to all Policies of at least Three Years' standing, and effected for the whole duration of life.

To similar Policies the following BONUSES were declared at former Divisions, viz. :—

FIRST DIVISION, in 1832. On the average, upwards of 26 per cent. on the Premiums paid.

SECOND DIVISION, in 1839. On the average, 33 per cent. on the Premiums paid for the preceding Seven Years.

The true principles on which Life Assurance ought to proceed have been maintained by this Company, and are comprised,

IN PERFECT SECURITY to the assured.

A RATE OF PREMIUM graduated fairly to the risk at every age.

A DIVISION OF THE SURPLUS of the Company periodically to the Assured, strictly proportioned to their interest therein.

A FAIR AND LIBERAL PERMISSION to the Assured to proceed to all parts of the world, on due notice, and the payment of a premium equitably adjusted to the risk incurred.

GENERAL FACILITIES for the taking out, renewal, or purchase of Policies, the honourable settlement of Claims, and an exemption from all charges or deductions except for Government Stamps.

The accumulated Capital of the Company actually invested exceeds **£650,000.**

The Bonuses already allotted to the Assured exceed **£210,000.**

The Prospectus, Tables of Rates, &c., to be had at the Office in London, or of the Company's Agents.

69] T. G. CONYERS, *Secretary.*

UNITED KINGDOM LIFE
ASSURANCE COMPANY,

8, WATERLOO PLACE, PALL MALL, LONDON.

Capital........£1,000,000.

ANNUAL INCOME UPWARDS OF £100,000, ARISING FROM THE ISSUE OF ABOVE 7000 POLICIES.

TRUSTEES.

Chas. Graham, Esq., F.S.A.
Charles Downes, Esq.
F. C. Maitland, Esq.
E. Lennox Boyd, Esq., F.S.A.

PRESIDENTS.

Earl of Courtown
Earl Leven and Melville
Earl of Norbury
Earl of Stair
Earl Somers
Lord Viscount Falkland
Lord Elphinstone
Lord Belhaven and Stenton
William Campbell, Esq., of Tillichewan

LONDON BOARD.

Charles Graham, Esq., F.S.A., *Chairman*
Chas Downes, Esq., *Dep.-Chairman*
H. Blair Avarne, Esq.
Edw. Lennox Boyd, Esq., F.S.A., *Resident*
Chas. Berwick Curtis, Esq.
William Fairlie, Esq.
D. Q. Henriques, Esq.
J. G. Henriques, Esq.
F. Chas. Maitland, Esq.
William Railton, Esq.
F. Hale Thomson, Esq.
Thomas Thorby, Esq.

EDINBURGH BOARD.

Adam Black, Esq.
Sir Alexander Gibson Maitland, Bart.
C. H. Craigie Inglis, Esq.
J. T. Gordon, Esq., Sheriff of Edinburghshire
Jas. Hunt, Esq., of Pittencrieff, Moray-place

Agent—P. S. Fraser, Esq., 81, George-street.
Medical Officers—Alexander Gillespie, Esq., M.D.; James D. Gillespie, Esq., M.D.
Law Agents—Messrs. J. & W. R. Kermack.

GLASGOW BOARD.

Robert Salmond, Esq., Banker, Glasgow
J. Bain, Esq., of Morriston
Wm. Stirling, jun., Esq., Kenmure
James Robertson, Esq., Banker, Glasgow
William Connal, jun., Esq., Merchant, Glasgow

Agent—A. B. Seton, Esq., 12, St. Vincent-place.
Medical Officer—Joseph Bell, Esq., Surgeon.
Solicitor—A. Reid, Esq., 73, St. Vincent-place.

Bankers—The Bank of England; Messrs. Cocks, Biddulph, & Co.; and the Union Bank of London.
Surgeon—F. H. Thomson, Esq.
Solicitors—Messrs. Tatham, Upton, Johnson, & Co.
Actuary—John King, Esq.
Secretary—Patrick Macintyre, Esq.

This Company was established in 1834, by a Special Act of Parliament, and affords the most perfect security in its large paid-up Capital, held by a large, numerous, and wealthy Proprietary.

The Tables have been formed on the lowest scale compatible with security, and constructed to meet the various wants of Assurers, and every risk to which protection by Assurance can be extended.

EXTRACT OF TABLE OF RATES.

Age	Without Profits.	With Profits.	
20	£1 13 10	£1 18 8	per Cent.
30	2 3 10	2 8 2	ditto
40	2 19 1	3 3 4	ditto

Premiums may be paid in almost any way to meet the convenience of the Public.

One-half the Annual Premium need only be paid for the first five years, the other being allowed to remain at five per cent. interest, thus affording parties desirous of effecting SHORT TERM POLICIES the advantage of having a LIFE POLICY at a scarcely increased outlay.

Parties insured with this Company are not restricted in their limits of travel, as in most other Offices, but may proceed from one part of Europe to another, in decked vessels, without licence, and to British North America, and many parts of the States, without extra Premium, by merely giving the ordinary notice of the intended visit.

Whole World Life Policies are granted at slightly increased Rates of Premium, thus rendering a Policy in Money Transactions a real Security.

SECOND SEPTENNIAL DIVISION OF PROFITS AMONG THE ASSURED.

In 1841 the Company declared a Bonus of **£2 per Cent.** per Annum on the Sum insured, to all Policies of the Participating Class, from the time they were effected to the 31st December, 1840; and from that date to 31st December, 1847, **2¼ per Cent.** per Annum was added at the General Meeting on 6th July, 1848. The Bonus thus added to Policies from March 1834, to 31st December 1847, is as follows:—

Sum Assured.	Time Assured.	Sum added to Policy in 1841.	Sum added to Policy in 1848.	Sum payable at Death.
£5000	14 Years	£683 6 8	£787 10 0	£6470 16 8
1000	12 Years	100 0 0	157 10 0	1257 10 0
* 1000	7 Years	.. .. ..	157 10 0	1157 10 0
500	12 Years	50 0 0	78 15 0	628 15 0
500	1 Year	.. .. ..	11 5 0	511 5 0

* EXAMPLE.—At the commencement of the year 1841, a person aged thirty effected a Policy for £1000, the Annual Payment for which is £24. 1*s*. 8*d*.; in 1847 he had paid in Premiums £168. 11*s*. 8*d*.; but the Profits being 2¼ per cent. per annum on the sum insured (which is £22. 10*s*. per annum for each £1000), he had £157. 10*s*. added to his Policy; almost as much as the Premiums paid.

Parties desirous to Participate in the **forthcoming Bonus should lose no time** *in applying for immediate information to the Resident Director, Waterloo-place, London, or to the following Agents:—*

Paris	C. Hartwieg, Esq., 18, Rue Vivienne
Brussels	Messrs. Salter and Bigwood
Amsterdam	James Annesley, Esq., H.B.M.C.
Rotterdam	Sir J. H. Turing, Bart., H.B.M.C.
Malta	George Dalzell, Esq.
Oporto	Dr. Rumsey (Medical Referee)
New York	W. C. Maitland, Esq.
Halifax, N.S.	A. G. Frazer, Esq.
St. John, N.B.	A. Balloch, Esq.
Montreal	Messrs. Edmonstone and
Quebec	Peter Sheppard, Esq.
Naples	Dr. Cox (Medical Referee

Besides Agents in every important Town in England, Scotland, and Ireland.

ANNUAL DIVISION OF PROFITS AND LARGE REDUCTION OF PREMIUMS.

HAND-IN-HAND

FIRE AND LIFE INSURANCE SOCIETY,

1, NEW BRIDGE-STREET, BLACKFRIARS, LONDON.

Instituted in 1696; extended to Life Insurance 1836.

Immediate, Deferred, and Survivorship Annuities granted.

DIRECTORS.

The Hon. William Ashley.
The Hon. Sir Edward Cust.
John Lettsom Elliot, Esq.
James Esdaile, Esq.
Harvie M. Farquhar, Esq.
John Gurney Hoare, Esq.
E. Fuller Maitland, Esq.
The Hon. Charles John Murray.
William Scott, Esq.
John Sperling, Esq.
Henry Wilson, Esq.
Robert Winter, Esq.

AUDITORS.

The Hon. Colonel Cust
Thomas Fuller Maitland, Esq.
James Esdaile, Esq.

Bankers—Messrs. Goslings and Sharpe, 19, Fleet-street.

Physician—Thomas K. Chambers, M.D., 1, Hill-street, Berkeley-square.

Solicitors—Messrs. Lumley, Nicholl, and Smyth, 18, Carey-street.

Actuary—James M. Terry, Esq. **Secretary**—Robert Steven, Esq.

FIRE DEPARTMENT.

Although the lowest rates of premium, consistent with security, have been charged by the office, it has for many years been enabled to make very large returns to septennial insurers.

LIFE DEPARTMENT.

The important advantages offered by the plan and constitution of the Life Department of this Society are—

That insurers are protected by a large invested capital upon which there is no interest to pay, and for which no deduction of any kind is made, which enables the Directors to give the whole of the profits to insuring members.

That the profits are divided annually amongst all members of five years' standing, and applied towards reducing life insurance to the lowest possible rates of premium.

The following table exhibits the abatement of premium that has been made for the past nine years to members of five years' standing:—

Years of Division.	Rate of Abatement.	Years of Division.	Rate of Abatement.
1842	£45 per cent.	1847	£50 per cent.
1843	45 ,,	1848	50 ,,
1844	45 ,,	1849	52½ ,,
1845	50 ,,	1850	52½ ,,
1846	50 ,,		

A policy taken out on or before the 24th of June, 1845, at an annual premium of £100, will consequently be charged £47. 10*s*. as this year's premium; and it is expected that an equal abatement will in future be annually made.

That persons insuring their own lives, or the lives of others, may become members.

That persons who are willing to forego participation in the profits can insure at a lower rate than that charged to members.

The following table will show the effect of the reduction of premium made by the Society on members' policies that have been five years in force:—

Age when Insured.	Sum Insured.	Annual Premium for first Five Years.			Reduced Premium.		
	£	£.	*s.*	*d.*	£.	*s.*	*d.*
30	100	2	13	5	1	5	6
40	100	3	7	11	1	12	3
30	500	13	7	1	6	7	0
40	500	16	19	7	8	1	3
45	1,000	38	19	2	18	10	1
40	2,000	67	18	4	32	5	2
45	5,000	194	15	10	92	10	6

This system of reducing the premiums affords immediate benefit to the members, or enables them to insure a further sum upon their lives equal to more than one-third of the present policy, without any additional outlay.

1143]

ROBERT STEVEN, Secretary.

LONDON ASSURANCE CORPORATION,

Established by Royal Charter, in the Reign of King George the First, A.D. 1720.

HEAD OFFICE, No. 7, ROYAL EXCHANGE, CORNHILL;

BRANCH OFFICE, No. 10, REGENT-STREET.

WILLIAM KING, Esq., *Governor.*

ROBERT COTESWORTH, Esq., *Sub-Governor.* | EDWARD BURMESTER, Esq., *Deputy-Governor.*

DIRECTORS.

Robert Allen, Esq.
John Alves Arbuthnot, Esq.
Richard Baggallay, Esq.
George Barnes, Esq.
Henry Bonham Bax, Esq.
Henry Blanshard, Esq.
John Watson Borradaile, Esq.
Charles Crawley, Esq.
William Dallas, Esq.
Bonamy Dobree, jun., Esq.
James Dowie, Esq.
John Furse, Esq.
Samuel Gregson, Esq.
David Charles Guthrie, Esq.
John Alexander Hankey, Esq.
Edward Harnage, Esq.
Charles Kerr, Esq.
Charles Lyall, Esq.
John Ord, Esq.
George Probyn, Esq.
Patrick Francis Robertson, Esq.
Alexander Trotter, Esq.
Thomas Weeding, Esq.
Lestock Peach Wilson, Esq.

Secretary—John Laurence, Esq.

Manager of the Marine Department—Timothy Greated, Esq. | *Superintendent of the Fire Office*—Joseph Sparkes, Esq.

Underwriter—John Anthony Rucker, Esq. *Actuary*—Peter Hardy, Esq., F.R.S.

Superintendent of Branch Office—Abel Peyton Phelps, Esq.

Physician—George Budd, Esq., M.D., F.R.S., 20, Dover-street, Piccadilly.

Surgeon—Thomas Callaway, Esq., 7, Wellington-st., Southwark.

Solicitors—John Coverdale, Esq., 4, Bedford-row; Messrs. Tatham, Upton, Johnson, and Co., 20, Austin-friars.

Bankers—The Bank of England; Messrs. Willis and Co.

LIFE DEPARTMENT.

THIS CORPORATION has effected Assurances on Lives for A PERIOD OF ONE HUNDRED AND THIRTY YEARS; their first policy having been issued on the 7th June, 1721, to William, Lord Bishop of Sarum.

Two-thirds of the entire gross profits are appropriated to the Assured,—the Corporation retaining the remaining one-third, out of which they PAY THE WHOLE EXPENSES OF MANAGEMENT; thus affording to the public advantages equivalent to those derived from Mutual Assurance, WITHOUT LIABILITY OF PARTNERSHIP, and with ALL THE SECURITY afforded by AN OLD AND OPULENT CORPORATION. Policies may be opened under any of the three following plans, viz.:—

The Old Series, under which Assurers are admitted at very moderate Rates of Premium, without participation in Profits.

The Series 1831, under which Assurers are entitled, after the first Five Years, to an annual Abatement of Premium. The abatement at the last valuation was equivalent to a return of more than one-fourth of the Premium.

The Series 1846, under which Assurers are entitled to participate in the ascertained profits at the end of every five years, and to appropriate their share thereof, either as an immediate Cash Bonus, as an addition to the sum Assured, or it may be made a matter of special arrangement, and applied in any manner most convenient to the parties Assured. THE FIRST DIVISION under this Series took place on the 31st DECEMBER, 1850, and amounted, on an average, to A REVERSIONARY BONUS equivalent to about FIFTY-THREE PER CENT. upon the amount of Premiums paid.

TABLE showing the Actual **CASH** and **REVERSIONARY BONUS** added on the 31st December, 1850, to Policies effected in the Years 1846, 1847, 1848, 1849, and 1850:—

Year.	Present Age.	Sum.	Cash Bonus.	Reversionary Bonus.
1846	35	1,000	£42 12 0	£87 0 0
	50	1,000	59 4 0	98 6 0
1847	35	1,000	35 0 0	71 10 0
	50	1,000	47 18 0	79 10 0
1848	35	1,000	26 14 0	54 12 0
	50	1,000	36 8 0	60 8 0
1849	35	1,000	18 8 0	37 12 0
	50	1,000	24 0 0	39 12 0
1850	35	1,000	9 4 0	18 18 0
	50	1,000	12 8 0	20 12 0

Participating.		Non-Participating.	
Annual Premiums for Assurance of £100 for the whole term of a Single Life.		Annual Premiums for Assurance of £100 for the whole term of a Single Life.	
Age next Birthday.	Premium.	Age next Birthday.	Premium.
20	£2 0 2	20	£1 15 11
25	2 5 0	25	2 0 8
30	2 10 8	30	2 5 11
35	2 17 0	35	2 12 1
40	3 5 1	40	3 0 0
45	3 15 10	45	3 10 10
50	4 10 7	50	4 5 7
55	5 8 11	55	5 3 4
60	6 12 5	60	6 5 11
65	8 4 11	65	7 16 9

FIRE DEPARTMENT.

Fire Insurances may be effected at Moderate Rates upon every description of Property.

MARINE DEPARTMENT.

Marine Insurances may be effected at the Head Office of the Corporation. Policies for Sea Risks are also granted, claims on which are made payable in India and China, by the Corporation's Agents, at the following places:—Calcutta, Bombay, Madras, Canton, and Shanghai.

JOHN LAURENCE, Secretary.

SCOTTISH WIDOWS' FUND LIFE ASSURANCE SOCIETY.

FOUNDED A.D. 1815.

ON THE PRINCIPLE OF MUTUAL CONTRIBUTION.

THIS Institution, notwithstanding its local name, has long been favourably known to all classes in Great Britain and Ireland, and a better proof of the confidence reposed in it by the public could not probably be wished, than the fact that the **Average Amount of ASSURANCES effected during the last THIRTEEN YEARS has exceeded**

HALF A MILLION STERLING per Annum.

Being a Mutual Assurance Society, the Members are the only parties in any way interested in the Funds; they are, in point of fact, their own assurers, and whatever is paid by way of Premium, over and above what is actually required for the risk of the Assurance, is appropriated for their behoof. This is done once in every period of Seven Years, when an Investigation into the affairs of the Society takes place, not less than one-third of the Profits, as then ascertained, being set aside as a Guarantee Fund to maintain the stability of the Institution, and the remaining two-thirds being immediately divided among the Assured—each member being entitled to elect whether he will have the value of his share handed over to him at once *in cash*, or have it applied as an addition to his Policy, or towards reduction of the future Annual Premiums.

As a proof of the working of this system it may be stated, that in the case of a Policy opened with this Society in the year 1819, and emerging in the present year (after payment of the Premium), the representatives of the Member would receive **more than double the amount of the original Assurance.**

THE CAPITAL OF THE SOCIETY, arising from the Accumulation of the Members' Premiums, amounts at this time to upwards of **TWO MILLIONS AND A QUARTER STERLING.**

ANNUAL REVENUE, upwards of THREE HUNDRED THOUSAND POUNDS.

Every information can be readily obtained by application at the Society's Head Office, or at any of the Agencies.

JOHN MACKENZIE, *Manager.* WILLIAM LINDESAY, *Secretary.*

HEAD OFFICE, 5, ST. ANDREW-SQUARE, EDINBURGH.

OFFICE IN LONDON, 4, ROYAL EXCHANGE BUILDINGS.—HUGH M'KEAN, Agent. [I 139

EQUITY AND LAW
LIFE ASSURANCE SOCIETY,

No. 26, LINCOLN'S-INN-FIELDS, LONDON,

AND

LAW SOCIETY'S ROOMS, MANCHESTER.

TRUSTEES.

The Right Hon. Lord Monteagle.
The Right Hon. the Lord Chief Baron.
The Hon. Mr. Justice Coleridge.
The Right Hon. Lord Cranworth.
The Hon. Mr. Justice Erle.
Nassau W. Senior, Esq., Master in Chancery.
C. P. Cooper, Esq., Q.C., LL.D., F.R.S.
George Capron, Esq.

Policies do not become void by the Life Assured going beyond the prescribed limits, so far as regards the interest of third parties, provided they pay the additional Premium so soon as the fact comes to their knowledge.

"Free Policies" are issued, at a small increased rate of Premium, which remain in force, although the Life Assured may go to any part of the world.

The Tables are especially favourable to young and middle-aged Lives; and the limits allowed to the Assured, without extra charge, are unusually extensive.

Eighty per cent. of the Profits is divided at the end of every fifth year among the Assured.

At the First Division to the end of 1849, the addition to the amount assured averaged above 50 per cent. on the Premiums paid. [I 59

THE CITY OF LONDON
LIFE ASSURANCE SOCIETY,

FOR

ACCUMULATIVE AND GENERAL

ASSURANCES.

2, ROYAL EXCHANGE BUILDINGS.

Directors.

R. C. BACHE, Esq.
W. BETTS, Esq.
J. R. BENNETT, Esq., M.D.
J. BLAKEWAY, Esq.
C. COLLICK, Esq.
G. M. DOWDESWELL, Esq.
F. A. DURNFORD, Esq.
R. KEATE, Esq., Serj.-Surg. to the Queen.
S. H. LEE, Esq.
JOHN POWIS, Esq.
Lieut.-Colonel ROWLAND, R.A.
W. SIMPSON, Esq.
W. THACKER, Esq.
W. A. THOMAS, Esq.
F. WATTS, Esq., F.S.A.
G. W. WOOD, Esq.

Actuary.

G. S. FARRANCE, Esq., F.I.A.

Policies indisputable.

All the profits of the Mutual Branch divided amongst the Assured.

Every form of Assurance at equitable rates.

Policies granted from £20 applicable to all classes.

I 87] EDWARD F. LEEKS, A.I.A., Sec.

BRITISH EMPIRE
MUTUAL LIFE ASSURANCE COMPANY,

INCORPORATED BY ACT OF PARLIAMENT,

37, NEW BRIDGE-STREET, BLACKFRIARS, LONDON.

DIRECTORS.

Bennett, C., Jun., Esq., Copthall-court.
Bunnell, Peter, Esq., Cheshunt.
Burton, John R., Esq., Dover-road.
Cartwright, R., Esq., Chancery-lane.
Cuthbertson, F., Esq., Aldersgate-street.
Gardiner, B. W., Esq., Princes-street, Cavendish-square.
Gover, William, Esq., Highgate.
Gover, J., Esq., Cole-street North, Dover-road.
Groser, W., Esq., Red Lion-street, Clerkenwell.
Lewis, G. C., Esq., Lowndes-terrace, Knightsbridge.
Millar, R. J., Esq., Holland-grove, North Brixton.
Sanders, J., Esq., Sutherland-square, Walworth.

AUDITORS.

Burge, Geo. W., Esq., Hackney-road.
Porter, J. Long, Esq., Sloane-street.

BANKERS.

London and Westminster Bank, Lothbury.

SURGEON.

John Mann, Esq., Charterhouse-square.

SOLICITORS.

Messrs. Watson & Sons, Bouverie-street, Fleet-street.

This Company is founded on purely mutual principles: there is no proprietary under any form to absorb any portion of the profits, which all belong to the Members at large, by whom also the Directors are appointed.

During the year 1850 the following new Policies were executed, in addition to the old business:—

	No.	Amount.	Yearly.
Life Assurances	809	£136,365	
Annuities	14		£202
Investments	410	27,964	
Total	1233	£164,329	£202

There were advanced to the Members in the same period, on various descriptions of available security, 7220*l.*

This Company is adapted to meet all the varied wants of its Members. By its Life Policies provision may be made for the evils anticipated from the death of the party assured. By its Deferred Annuities a certain income may be secured when advancing years render labour less remunerative. By its Immediate Annuities a sum of money which now yields an inadequate support in the shape of interest may be rendered much more productive; while the Investment Assurances enable every one to make provision for the time of sickness or other calamity requiring pecuniary aid. The employment of the funds in advances to the Members places within their reach the means of enlarging their trade capital, or of making advantageous purchases as opportunities offer.

As there are many important towns in which Agents are not yet appointed, the Directors are open to receive applications from respectable persons in such places. If not already Members of the Company, they will be required to become so by effecting a life assurance.

Upon receipt of two postage stamps the Prospectus, with Forms, &c., will be forwarded, in which some important and novel applications of Life Assurance will be found.

W. S. Gover, *Actuary and Secretary.*

January 15*th*, 1851.

BRITISH EMPIRE
MUTUAL FIRE ASSURANCE SOCIETY,

INCORPORATED BY ACT OF PARLIAMENT,

37, NEW BRIDGE-STREET, BLACKFRIARS, LONDON.

DIRECTORS.

Blyth, John, Esq., Aldersgate-street.
Cartwright, R., Esq., Chancery-lane.
Cuff, J. H., Esq., Sutherland-square, Walworth.
Cuthbertson, F., Esq., Aldersgate-street.
Freeman, G. S., Esq., Camberwell.
Gould, G., Esq., Loughton, Essex.
Low, J., Esq., Gracechurch-street.
Miers, T., Esq., Upper Clapton.
Olney, T., Esq., Borough.
Wilmshurst, J., Esq., Kensington.

AUDITORS.

Latter, R., Esq., Fenchurch-street.
Pewtress, J. W., Esq., Gracechurch-street.

BANKERS.

Messrs. Barclay, Bevan, Tritton, & Co., Lombard-street.

SOLICITORS.

Messrs. Watson & Sons, Bouverie-street, Fleet-street.

This Society (although entirely distinct in its funds and management) is conducted at the same Offices, and on the same principles, as the British Empire Mutual Life Assurance Company.

It is designed to extend to Fire Assurance the Mutual principle which has been found so successful in its application to Life Assurance.

During the year 1850, 1680 new Policies have been issued, assuring property to the amount of £656,423. A large amount of business was obtained in former years.

The Profits are divided every three years.

Less than One-Third of the Premiums have paid all the Losses.

Assurances can be effected daily at the Chief Offices, or at any of the Agents of the Society throughout the Empire.

January 15*th*, 1851.

W. S. Gover, *Secretary.*

UNIVERSAL
LIFE ASSURANCE SOCIETY.

Established 1834.

EMPOWERED BY SPECIAL ACT OF PARLIAMENT.

1, KING WILLIAM-STREET, LONDON.

For the Assurance of Lives at Home and Abroad, including Gentlemen engaged in the Military and Naval Services.

DIRECTORS.

Sir HENRY WILLOCK, K.L.S., *Chairman.*
JOHN STEWART, Esq., *Deputy-Chairman.*

Major-Gen. Sir RICH. ARMSTRONG, C.B., K.C.T. & S.
JOHN BAGSHAW, Esq., M.P.
AUGUSTUS BOSANQUET, Esq.
CHAS. DASHWOOD BRUCE, Esq.
ELLIS WATKIN CUNLIFFE, Esq.
WILLIAM KILBURN, Esq.
FRANCIS MACNAGHTEN, Esq.
CHARLES OTWAY MAYNE, Esq.
WILLIAM ROTHERY, Esq.
ROBERT SAUNDERS, Esq.
JAS. DUNCAN THOMSON, Esq.
CAPTAIN SAMUEL THORNTON, R.N.

BANKERS—BANK OF ENGLAND and Messrs. CURRIE & Co.
SOLICITOR—WILLIAM HENRY COTTERILL, Esq.
PHYSICIAN—G. BURROWS, M.D., F.R.S., 18, Cavendish-sq.

The principle adopted by the Universal Life Assurance Society, of an annual valuation of assets and liabilities, and a division of three-fourths of the profits among the assured, is admitted to offer great advantages, especially to those parties who may wish to appropriate their proportion of profit to the reduction of future premiums. This practice of an annual division is especially advantageous to persons of advanced years, who cannot hope to participate in many septennial or decennial divisions.

The ANNUAL REDUCTION has averaged considerably **ABOVE 40 PER CENT.**, and in no one year has it fallen below that amount.

The attention of gentlemen connected with India is particularly requested to the regulations of this Society; as, on comparison with other offices, its terms will be found peculiarly advantageous, especially as regards the liberal plan adopted on the return of Indian Assurers to reside permanently in this country; and the Indian rates have been calculated from extensive data and tables, exclusively in the possession of this Society, by which the true risk of life during residence in India has been most accurately ascertained.

142] MICHAEL ELIJAH IMPEY, Secretary.

PROMOTER LIFE ASSURANCE AND ANNUITY COMPANY, No. 9, Chatham Place, Blackfriars, London. Established in 1826.—Subscribed Capital, 240,000*l.*

This Society effects every description of Life Assurance, both Domestic and Foreign, on most advantageous terms, either on the Bonus or Non-Bonus systems.

Tables of Rates, with all further particulars, may be obtained at the Office.

186] M. SAWARD, *Secretary.*

ESSEX ECONOMIC FIRE OFFICE,

CHELMSFORD.

Established 1824,

Chiefly for insuring CORN-MILLS at moderate rates.

LONDON AGENTS:

B. WHITE, at Messrs. Kingsford & Lay's, Corn Exchange, Mark-lane.
PHILIP BOWES, 26, King William-street, West Strand. [138

TO SECRETARIES, MANAGERS, AND OFFICIALS IN BANKS, RAILWAYS, AND OTHER COMPANIES.

THE UNITED GUARANTEE & LIFE ASSURANCE COMPANY.

Capital, fully subscribed, 100,000*l.*, *with power to increase the amount to* 500,000*l.*

OFFICES:

36, Old Jewry, London;
34, Mosley-street, Manchester; 4, North John-street, and 5, Exchange-court, Liverpool.

DIRECTORS.

The Right Honourable Lord Erskine, *Chairman.*
Joshua P. Brown Westhead, Esq., M.P., *Vice-Chairman.*

Josiah Bates, Esq.
John Field, Esq.
Thos. Carlyle Hayward, Esq.
Charles Podmore, Esq.
Daniel Shears, jun., Esq.
Richard Swift, Esq.
Thomas Winkworth, Esq.

MANCHESTER LOCAL COMMITTEE.

Sir Elkanah Armitage, Knt., Ald., Chairman.
Thomas Bazley, Esq., Vice-Chairman.
John Bannerman, Esq.
Richard Birley, Esq.
The Hon. Thomas Erskine.
William Gibb, Esq.
Thomas Greig, Esq.
Matthew Lyon, Esq.
John B. Markland, Esq.
John Mayson, Esq.
Simon Pincoffs, Esq.
Edward Tootal, Esq.
C. J. S. Walker, Esq., Ald.

GUARANTEE DEPARTMENT.—A reduction of 20 per cent. on the sixth payment. An immediate and considerable reduction if a Life Assurance be combined with the Guarantee.

LIFE DEPARTMENT.—Profits of both departments divisible among the assured on the participating scale. Foreign and colonial risks on moderate terms. Payments taken quarterly, half-yearly, or annually. Medical referees paid by the company.

Prospectuses, forms of proposal, and other information may be obtained at 36, Old Jewry,

By order, JAMES KNIGHT, Secretary.

N.B.—No charge for Policy Stamps. [174

THE MUTUAL LIFE ASSURANCE SOCIETY,

39, KING-STREET, CHEAPSIDE.

ESTABLISHED 1834.

DIRECTORS.

S. Adams Beck, Esq.
John Clayton, Esq.
Solomon Cohen, Esq.
Charles Coles, Jun., Esq.
R. F. Davis, Esq.
W. F. A. Delane, Esq.
Rear-Admiral Sir A. P. Green, K.C.H.
W. Chapman Harnett, Esq.
Valentine Knight, Esq.
John Mollett, Esq.
Richard Morris, Esq.
J. Pennethorne, Esq.
Samuel W. Rowsell, Esq.
Folliott S. Stokes, Esq.
James Whiskin, Esq.

The Society is constituted on *purely mutual* principles, the *entire profits* being divided amongst the Members.

The total number of policies effected up to the 31st December, 1850, was 1786, for assuring 1,256,628*l.*

In the past year 200 proposals were made for assuring 120,213*l.*, of which number 155, for assuring 86,015*l.*, were accepted and completed.

The Divisions of Profit are made annually on the 31st December. Every Member participates therein who has paid two annual premiums on his policy.

Every Member shares in the Profits in proportion to the number and amount of the premiums paid, accumulated at compound interest.

At 31st December, 1850, the Society had been established nearly seventeen years, and the additions then allotted to the three oldest policies were as follow:—

Policy No.	Age at Admission.	Amount assured.	Premiums paid.	Additions.	Payable in case of death during 1851.
		£.	£. s. d.	£. s. d.	£. s. d.
1	29	1000	408 0 0	306 3 0	1,306 3 0
2	42	2000	1,218 6 8	757 3 0	2,757 3 0
3	50	2000	1,541 6 8	858 4 0	2,858 4 0

SAMUEL BROWN, Actuary.

The Directors are prepared to appoint suitable Agents in country towns. Further information may be obtained from the Actuary. [19

EUROPEAN LIFE INSURANCE & ANNUITY COMPANY.

Established, January, 1819. Empowered by Special Act of Parliament, 7 & 8 Vict. c. 48.

OFFICE, 10, CHATHAM-PLACE, BLACKFRIARS, LONDON.

Court of Directors.

John R. Carnac, Esq.	46, Devonshire-street, Portland-place.
Henry H. Harrison, Esq.	1, Percy-street, Bedford-square.
Charles Hill, Esq.	25, Hyde-Park-square.
William P. Jervis, Esq.	Twickenham.
Capt. William Jesse	Maisonette, Ingatestone, Essex.
George Lee, Esq.	23, Crutched Friars.
William Sargent, Esq.	Putney Heath.
Frederick Silver, Esq.	10, James-street, Buckingham-gate.
John Stewart, Esq.	22, Portman-square.
George J. Sulivan, Esq.	Wilmington, Ryde, Isle of Wight.
Capt. W. G. H. Whish, R.N.	10, Cumberland-street, Hyde Park.

Auditors.

Samuel Buller Lemon, Esq., Custom House, London.
R. Mills, Esq., Taxing Master, Staple Inn, and Eltham.
The Rev. Samuel Silver, M.A., Cambridge.

Solicitor.—Thomas W. Bolton, Esq., 4, Elm-court, Temple.

Bankers.

Bosanquet, Franks, and Whatman, 73, Lombard-street.
Sir W. P. Call, Bart., and Co., 25, Old Bond-street.

Medical Officers.

Henry Davies, Esq., M.D., 18, Saville-row.
Alexander Bridge, Esq., Surgeon, F.R.C.S., 66, St. James's-street.
E. D. Silver, Esq., M.D., 11, Wimpole-street, Cavendish-square.

Secretary.—Wm. Barton Ford, Esq.

ADVANTAGES OFFERED BY THIS OFFICE.

Long standing—Established 1819. Undoubted security from a large paid-up capital and accumulated premiums. Diseased lives assured at equitable rates.

The participating or non-participating scales of Premium: if participating, 80 per cent. is appropriated to Policy-holders every fifth year—if non-participating, the rates are as low as can with safety be charged. Liberty to the Insurer to proceed to, and reside in, places beyond the limits of Europe. Premiums on Policies received yearly, half-yearly, or quarterly, or on a descending scale; or Half Premiums received for five or seven years.

Loans granted on Policies, or on Freehold, Leasehold, or Copyhold Securities, accompanied by Policies of Life Assurance. Loans granted on undoubted Personal Security.

Policies granted to meet every contingency. Medical men remunerated for their reports. A liberal commission to solicitors and others bringing business to the Society.

By the condition of the Policies issued by this Company, it is agreed "that the documents upon the faith whereof the Policy is granted shall be conclusive evidence of the age and state of health of the party assured, unless fraud or wilful misrepresentation be discovered therein." *No probability of Claims being disputed, the Company having paid to Policy-holders nearly* 600,000*l. without dispute or litigation.*

Examples of Premiums for Insuring 100*l. on a single Life.*

WITHOUT PROFITS.			Age next Birth-day.	WITH PROFITS.		
Quarterly.	Half-yearly	Yearly.		Yearly.	Half-yearly	Quarterly.
£. s. d.	£. s. d.	£. s. d.		£. s. d.	£. s. d.	£. s. d.
0 9 4	0 18 1	1 14 5	**20**	1 18 3	1 0 0	0 10 3
0 12 0	1 3 2	2 4 0	**30**	2 8 1	1 5 3	0 13 0
0 15 8	1 10 6	2 18 0	**40**	3 3 6	1 13 4	0 17 3
1 2 0	2 3 0	4 2 0	**50**	4 8 8	2 6 3	1 3 9
1 14 6	3 7 6	6 8 6	**60**	6 13 6	3 10 0	1 16 0

The next Bonus will be declared in 1855, and afterwards at the expiration of every fifth year. Every Bonus will be added to the sum insured; but the person entitled thereto may arrange with the Company at any time within three months after the declaration thereof to receive the value—In cash: *or* In an equivalent reduction of future Premiums: *or* If the Bonus amount to 50*l.* or upwards, may have a new Policy on the life, free from the payment of any Premium: *or* The Bonus may be dealt with as shall be specially agreed upon.

William Barton Ford, Secretary. [1 149

HOLDERS of LIFE-ASSURANCE POLICIES, *and those who wish to effect* Life Assurances, are invited to write to HENRY AGGS, of 1a, Bishopsgate Street Within, London, who, without charge, will communicate important information. All letters are expected to be prepaid, but replies will be unstamped, unless provided. [1 299

RELIANCE

MUTUAL LIFE ASSURANCE SOCIETY.

No. 71, King William-street, Mansion-house, London.

The Entire Profits divided among the Assured.

Directors.

Vernon Abbott, Esq.
Lieut.-Colonel Abdy.
George Ashlin, Esq.
H. J. Hall, Esq., R.N.
John James, Esq.
John Ledger, Esq.
R. W. S. Lutwidge, Esq.
Henry T. Prinsep, Esq.
William Phelps, Esq.
Charles H. Smith, Esq.
James Traill, Esq.
Wm. Foster White, Esq.
George Whitmore, Esq.
Edward Winslow, Esq.
John Young, Esq.

Advantages presented by this Society.

Life Assurances may be effected upon *Equal*, *Half-Premium*, *Increasing*, or *Decreasing* Scales; also by *Single Payments*, or *Payments for limited periods*. Tables have been specially constructed for the Army, Navy, East India Company, and Merchant Services; also for persons voyaging to, or residing in, any part of the world.

Endowments for Widows and Children, Pensions for retired Officers and Civilians, Immediate or Deferred Annuities, and Survivorships.

The Bonuses declared by the Society gave a Reduction of premiums, until next division of profits averaging 36 *per cent. on Policies in force Five Years, or an addition to the Sums Assured, ranging from one-third to one-half of the total amount of Premiums paid.*

197] E. OSBORNE SMITH, Actuary and Sec.

ROYAL MAIL STEAM-PACKET OFFICES,

52, GRACECHURCH-STREET, *and*
34, REGENT-CIRCUS, PICCADILLY, LONDON.

CONVEYANCE OF PARCELS, SAMPLES, PAPERS, &c.—The most expeditious method of forwarding such Packages to and from all parts of the Continent is through the

BRITISH AND CONTINENTAL DAILY EXPRESS PARCELS AGENCY,

SIMULTANEOUSLY WITH THE MAILS.

Parcels booked in London before 3 in the afternoon will arrive in Paris early the next morning; in Brussels, Antwerp, Ghent, &c., about noon; and at Cologne in the evening.

Parcel Rates, *including all charges excepting Customs Duties and Entries, if any.*

Between London and Cologne.		Belgium.	France.
	s. d.	s. d.	Under 14 lbs. weight each.
Under ½ lb. weight	2 6	2 6	Calais and Boulogne, 3s.
From ½ " to 2 lbs.	3 0	3 0	Paris, 5s.
" 2 " to 6 "	4 6	3 6	Lille, Roubaix, Tourcoing, Valenciennes, &c., at Belgian rates.
" 6 " to 10 "	5 0	4 0	
" 10 " to 14 "	5 6	4 6	
For every 2 lbs. extra	0 6	0 6	

The Rates charged by Prussian post to places beyond Cologne are very moderate. Tables may be had of the Agents.

Agents.—*London*, Geo. Hayward, 52, Gracechurch-street.—*Liverpool*, H. Retemeyer, Castle-street.—At *Cologne*, H. Ristelhueber and Co., through whom all parcels from *Germany*, *Austria*, *Russia*, *Denmark*, *Italy*, and *Switzerland* should be sent.—From *Belgium* through J. Piddington, 74, Montagne de la Cour, *Brussels*.—A. Daile, *Ghent*.—Louis Carbon, *Ostend*.—From *Antwerp* and *Holland* through C. Froment.—J. Friend, *Dover* and *Folkestone*, Custom House Agent, to whom packages of Merchandize to and from France may be consigned. [1 266

THE NATIONAL
REVERSIONARY INVESTMENT COMPANY.

OFFICES,
No. 63, OLD BROAD-STREET, LONDON, AND
No. 10, HILL-STREET, EDINBURGH.

Directors.

JOHN PEMBERTON HEYWOOD, Esq., *Chairman.*
RICHARD E. A. TOWNSEND, Esq., *Deputy-Chairman.*

BIGG, EDWARD SMITH, Esq.
COOPE, OCTAVIUS E., Esq.
COWAN, ALEXANDER, Esq.
DICKSON, ROBT., M.D., F.L.S.
FUSSELL, THOMAS, Esq.
GADESDEN, JAMES, Esq.
KENDAL, JOHN, Esq.
SCADDING, E. WARD, Esq.
SHEPPARD, GEORGE, Esq.
WILDE, CHARLES N., Esq.

Solicitors.

Messrs. CARDALE, ILIFFE, and RUSSELL, Bedford-Row, London.

Agents in Edinburgh.

Messrs. MENZIES and MACONOCHIE, W. S.

The Directors are prepared to purchase Reversionary Interests, either absolute or contingent, and whether secured upon Real or Personal Estate, and also Life Interests or Annuities.

Forms for submitting Proposals for Sale may be obtained at the Offices of the Company.

I 214] G. A. RENDALL, Secretary.

PROVIDENT LIFE OFFICE,

50, REGENT STREET.
CITY BRANCH: 2, ROYAL EXCHANGE BUILDINGS.
ESTABLISHED 1806.
POLICY HOLDERS' CAPITAL, £1,192,818.
ANNUAL INCOME, £150,000. BONUSES DECLARED, £743,000.
Claims paid since the establishment of the Office,
£2,001,450.

PRESIDENT.
THE RIGHT HONOURABLE EARL GREY.

DIRECTORS.

THE REV. JAMES SHERMAN, *Chairman.*
HENRY BLENCOWE CHURCHILL, Esq., *Deputy-Chairman.*

HENRY B. ALEXANDER, Esq.
GEORGE DACRE, Esq.
WILLIAM JUDD, Esq.
Sir RICHARD D. KING, Bart.
The Hon. ARTHUR KINNAIRD.
THOMAS MAUGHAM, Esq.
WILLIAM OSTLER, Esq.
APSLEY PELLATT, Esq.
GEORGE ROUND, Esq.
FREDERICK SQUIRE, Esq.
WILLIAM HENRY STONE, Esq.
Capt. WM. JOHN WILLIAMS.

J. A. BEAUMONT, Esq., *Managing Director.*

Physician.
JOHN MACLEAN, M.D., F.S.S., 29, Upper Montague Street, Montague Square.

Nineteen-Twentieths of the Profits are divided among the Insured.

Examples of the Extinction of Premiums by the Surrender of Bonuses.

Date of Policy.	Sum Insured.	Original Premium.				Bonuses added subsequently, to be further increased annually.		
	£.	£.	s.	d.		£.	s.	d.
1806	2500	79	10	10	Extinguished	1222	2	0
1811	1000	33	19	2	ditto.	231	17	8
1818	1000	34	16	10	ditto.	114	18	10

Examples of Bonuses added to other Policies.

Policy No.	Date.	Sum Insured.	Bonuses added.			Total with additions, to be further increased.		
		£.	£	s.	d.	£.	s.	d.
521	1807	900	982	12	1	1882	12	1
1174	1810	1200	1160	5	6	2360	5	6
3392	1820	5000	3558	17	8	8558	17	8

Prospectuses and full particulars may be obtained upon application to the Agents of the Office in all the principal towns of the United Kingdom, at the City Branch, and at the head Office, No. 50, REGENT STREET. [1 219

TO CAPITALISTS.—20.000*l.* to 50,000*l.* required by the Advertiser, to introduce a celebrated form of Vessel, and the application of Machinery to Shipbuilding, whereby a saving of 20 per cent. will be effected in their construction. For further information (by Principals only) apply by letter first to R. A., care of Mr. CLARKE, 4, St. Dunstan's Alley, St. Dunstan's Hill, London. [1 208

COMMISSION AND FORWARDING AGENT.

THE SUBSCRIBER, having an opportunity of more extensively cultivating his business as COMMISSION and FORWARDING AGENT, is ready to enter into arrangements with first-class Firms desiring such aid. Representing in all Scotland first-class Houses, his knowledge of general business may be relied on.

The Subscriber intimates to his Customers and Friends that he has Removed from No. 91, CONSTITUTION-STREET, to JOHN'S-LANE, CHARLOTTE-STREET, LEITH, and solicits their Import Orders for Dutch, German, and Russian produce.

WILLIAM BLACK.

Agent for NICHOLAS H. LUTGENS, Hamburgh.
,, VAN DULKEN, VAN DORP, & Co., Rotterdam.
,, CHARLES DEUBNER & Co., Riga.
John's-lane, Charlotte-street, Leith.

N.B.—On sale, on consignment, Prime KIEL BUTTER and GOUDA CHEESES. The Trade only supplied. [1 196

CAMBRIDGE MILITARY ASYLUM for Widows of Non-commissioned Officers and Privates of Her Majesty's Land Forces. In Memory of His Royal Highness the late Duke of Cambridge.

EDW. FRED. LEEKS, *Hon. Sec.*
Office, 2, *Charlotte-row*, *Mansion-house.* [1 89

ROYAL ASYLUM of ST. ANN'S SOCIETY.—By Voluntary Contributions. Affording a Home, Clothing, Maintenance, and Education, to Children of *those once in prosperity*—Orphans or not—from every Nation.

E. F. LEEKS, *Secretary.*
Offices, 2, *Charlotte-row*, *Mansion-house.* [1 88

BRITISH LYING-IN HOSPITAL
FOR MARRIED WOMEN.

FOUNDED IN BROWNLOW-STREET, 1749.
REBUILT IN ENDELL-STREET, LONG-ACRE, 1849.

SUPPORTED BY VOLUNTARY CONTRIBUTIONS.

THIS HOSPITAL (which was the first Institution of its kind) is capable of accommodating from 30 to 40 Patients; but to have the wards always occupied, additional support is necessary, as its resources are seriously reduced by the great and unavoidable expenses incurred in erecting the new building. Medical Attendance and Medicines are also provided for a large number of Patients at their own homes.

MEDICAL OFFICERS.

Consulting Physician.—Dr. HENRY DAVIES.
Dr. ROBERT LEE, 4, Saville-row.
BENJAMIN BROOKES, Esq., 37, Bedford-street, Covent-garden.
Dr. JOHN CLARKE, 3, Clifford-street.

Secretary.—Mr. R. S. DAVIES, at the Hospital.

Bankers.—Messrs. HOARE, 37, Fleet-street.

By all of whom Subscriptions and Donations will be thankfully received. [1 21

PRAYER-BOOK AND HOMILY SOCIETY.

Established 1812.

OFFICE, 18, SALISBURY-SQUARE, FLEET-STREET.

Patron.

His Grace the ARCHBISHOP of CANTERBURY.

President.

The Most Noble the MARQUIS of CHOLMONDELEY.

THIS Society is instituted for the circulation of the various Works which have been set forth by authority of the United Church of England and Ireland, both in the original and by means of translations.

Its funds, which arise from voluntary contributions, are employed in the active distribution of its various publications amongst those who are unable to procure them through the usual channels, either by free grant or by sale at less than the original cost.

Frequent testimonies are borne by Christian Missionaries, in various parts of the world, to the usefulness of the Society's labours, especially in the improvement and establishment of converts from heathenism, and in raising the tone of devotional feeling in congregations of native Christians.

The Society's labours at home may be exemplified by reference to its operations amongst Seamen and Emigrants. The agents visit almost every emigrant ship and large numbers of trading vessels in the port of London: the nature of the books which are offered is fully and candidly explained, and their use both individually and socially is affectionately urged upon the people. Social worship is frequently established on board in consequence of these persuasions, and by the help of the books supplied. A few years ago it was a very rare thing to hold divine worship on board ship; but now the crews of *considerably more than half* the ships visited in the port of London are assembled for that purpose on the Lord's Day.

The Society's *General Fund* is available for the expenses of translations, &c.

The operations on ship-board are supported by the *Special Fund for Emigrants and Seamen;* whilst the *Special Fund for Ireland* is devoted to efforts for spreading the light of the Gospel in that country.

Subscriptions and donations in aid of either of these funds will be thankfully received by the Secretaries.

The following list will give a general idea of the nature of the Society's publications:—

Arabic: Portions of Liturgy; Articles of Religion; Homily, 'On Reading the Scriptures.'
Bullom: Portions of Liturgy.
Chinese: Portions of Liturgy.
Danish: Homilies, 'On Reading the Scriptures,' &c.
Dutch: Prayers; Homilies, 'Of Faith,' 'Of Repentance,' &c.; also for Christmas Day, Good Friday, &c.
English: Prayer-Books of all sizes and prices; Arranged Services for Sundays; Family Prayer-Books; Collects and Catechism; Homilies, in volumes and tracts; Jewell's Apology; Nowell's Catechisms, &c. &c.
French: Prayer-Book; Selection of Prayers; Homilies in tracts—various subjects.
Gaelic: Family Prayers, and Homilies (in preparation).
German: Prayer-Book; Arranged Services; Homily tracts on various subjects.
Greek and Modern Greek: Prayer-Book.
Hebrew: Prayer-Book; and (in Rabbinical Heb.) Homilies, 'On Reading the Scriptures,' and for Christmas Day.
Indo-Portuguese: Prayer-Book; and Homilies, 'On Reading the Scriptures,' &c.
Irish: Portions of Liturgy; Prayer-Book reprinting; Homilies in preparation.
Italian: Prayer-Book (improved translation); Homily, 'Of Faith,' 'Of Prayer,' for Christmas Day, &c.
Latin: The Thirty-nine Articles of Religion.
Maori (New Zealand): Arranged Sunday Services; Family Prayers, nearly ready.
Persic: Portions of Liturgy.
Polish: Prayer-Book.
Portuguese: A Manual of Prayers; Homily, 'Against the Fear of Death,' &c.
Spanish: Prayer-Book; Selection of Prayers; and Homilies, 'Against the Fear of Death,' &c.
Swedish: Homilies, 'Of the Misery of all Mankind,' &c.
Welsh: Prayer-Book; Homilies, 'Of Salvation by only Christ our Saviour,' &c. [1 180

LIVERPOOL AND LONDON FIRE AND LIFE INSURANCE COMPANY.

Established in 1836. Empowered by Acts of Parliament.

OFFICES.—8 and 10, WATER-STREET, LIVERPOOL; 20 and 21, POULTRY, LONDON.

Trustees.

Sir THOS. BERNARD BIRCH, Bart., M. P.
ADAM HODGSON, Esq.
SAMUEL HENRY THOMPSON, Esq.

Directors in Liverpool.

WILLIAM NICOL, Esq., *Chairman.*
JOSEPH CHRIST. EWART, Esq. } *Deputy-Chairmen.*
JOSEPH HORNBY, Esq. }

THOMAS BROCKLEBANK, Esq.
WILLIAM DIXON, Esq.
WILLIAM EARLE, Esq.
T. STEUART GLADSTONE, Esq.
GEORGE GRANT, Esq.
FRANCIS A. HAMILTON, Esq.
FRANCIS HAYWOOD, Esq.
ROBERT HIGGIN, Esq.
GEORGE HOLT, Esq.

JOHN HORE, Esq.
GEO. HALL LAWRENCE, Esq.
HAROLD LITTLEDALE, Esq.
JOHN MARRIOTT, Esq.
EDWARD MOON, Esq.
CHARLES SAUNDERS, Esq.
HERMAN STOLTERFOHT, Esq.
JOHN SWAINSON, Esq.
JAMES ASPINALL TOBIN, Esq.

Secretary.—SWINTON BOULT, Esq.

Directors in London.

WILLIAM EWART, Esq., M.P., *Chairman.*
GEORGE FRED. YOUNG, Esq., *Deputy-Chairman.*

Sir W. P. DE BATHE, Bart.
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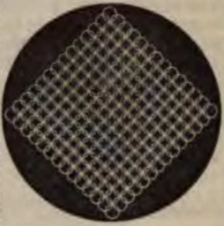

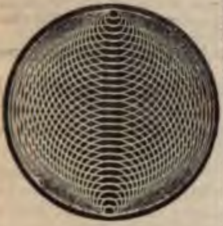

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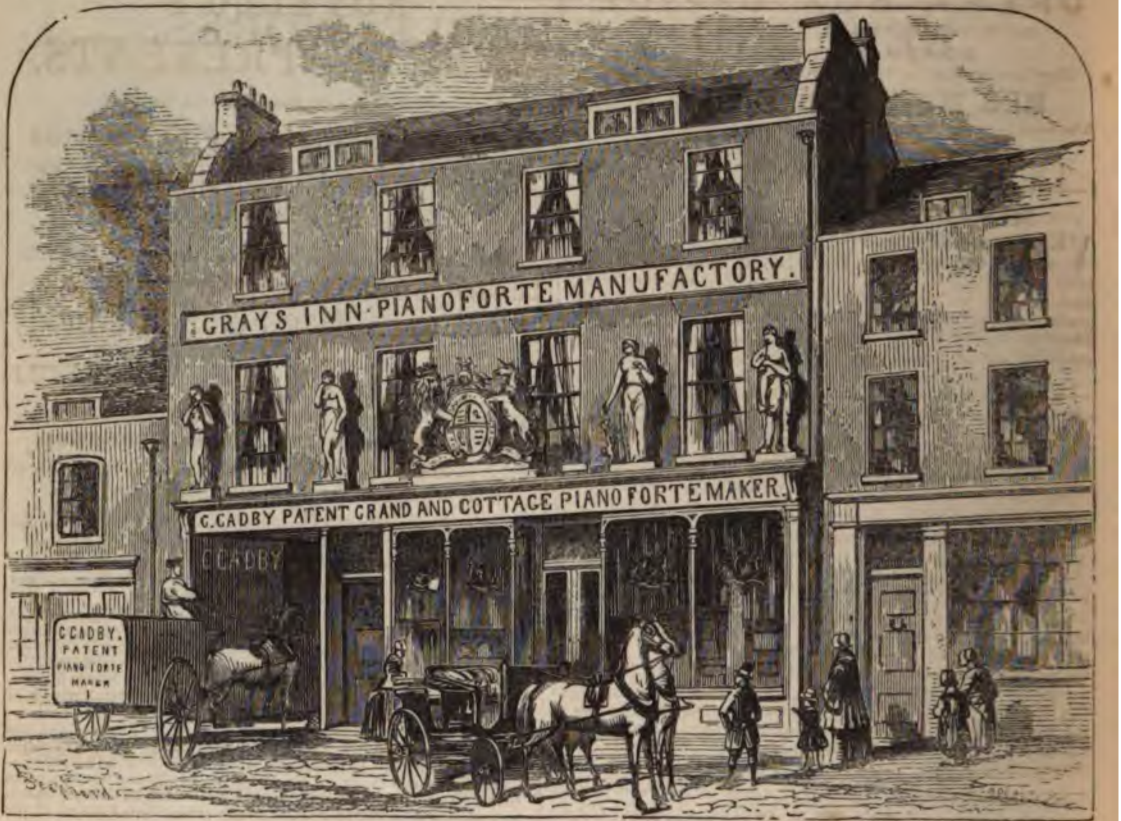
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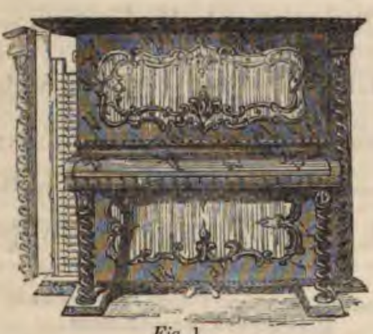
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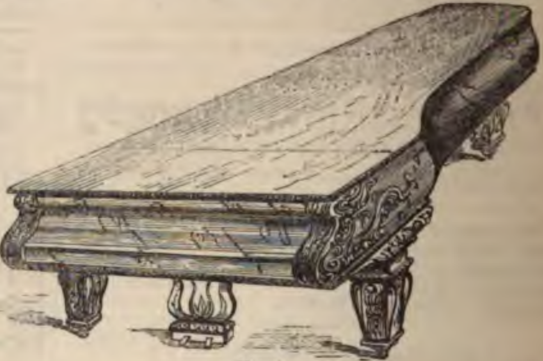
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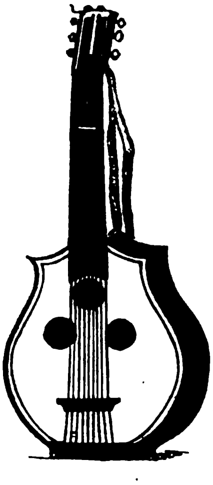
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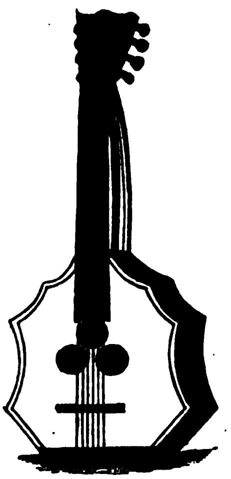
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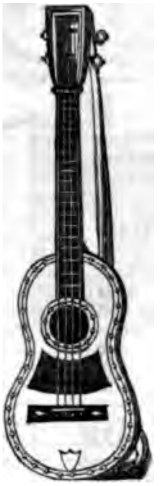
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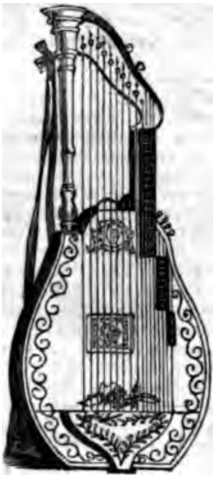
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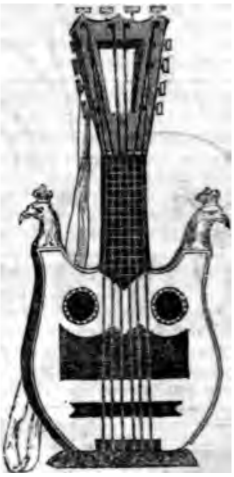
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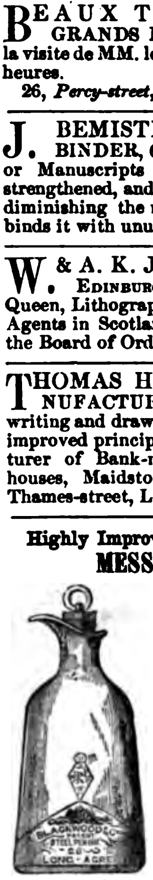

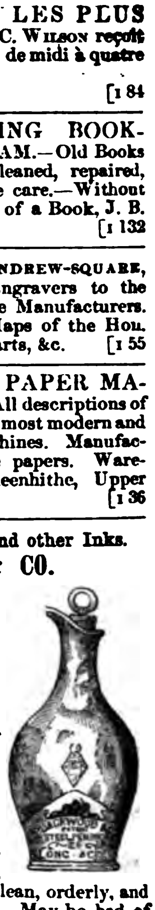

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The above was inserted in the *Times* of April 10th, June 2nd and 16th, 1849, and *Exeter Gazette.*

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Joshua records the *Sun* vertical to *Gibeon—Strabo* after a time to *Syene.*
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I have reason to believe that Solar with Mean Time varies a little nearly at every Degree of Longitude around the Globe. For instance, in London they agree with each other April 16th, September 1st, and about the time of Summer and Winter Solstices. Not so I think in Ireland. I apprised the Earl of Rosse (who erected the large telescope in Ireland) on November 6th, 1844, and the Royal Society, London, on February 1st, 1845, that I considered these times to agree at the West of Ireland about April 23rd, August 25th, and also near the time of Solstices; but to this date I have received no reply from either party as to correctness or incorrectness.—*May*, 1851.

England is attaining a greater latitude, exactly in the same proportion as the solstices of the *sun* are retreating from England, which is yearly, a *very small quantity.*

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See page in Illustrated Catalogue. [1 66

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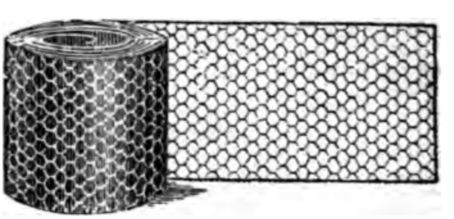

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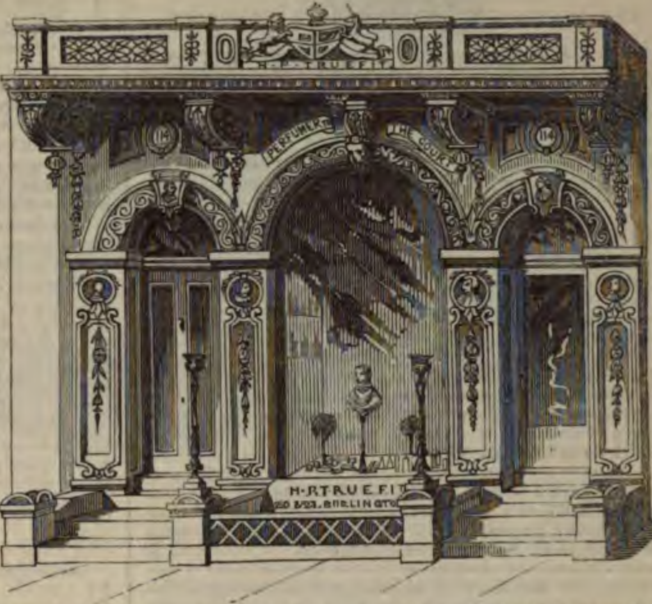

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being a branch of his far-famed Establishment at Nos. 20 and 21, Burlington-arcade (established upwards of thirty years). The Front, unequalled, it is believed, in any capital of Europe, is elaborately carved in Caen stone; whilst the spacious saloons for Hair-cutting, and private rooms for Hair-dressing, dyeing the Hair, and washing the head, are arranged with exquisite taste, and replete with every convenience. None but Assistants of first-rate talent are engaged; and in the shop will be found a splendid selection of every requisite for the toilet. The prices are in strict conformity with the economical spirit of the times. The charge for Hair-cutting is One Shilling. Everything in the same proportion.

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CERTAINTY IN DYEING THE HAIR has at last been thoroughly effected by the "TINCTURA," a fragrant extract, by which any shade in brown or black is produced instantly and permanently. Those who have been deceived by any of the dyes in use at present will appreciate the value of this important discovery. Private rooms, replete with every convenience, are reserved expressly for its application.—114, *Piccadilly.*

PERFECTION IN WIG-MAKING is accomplished by the introduction of H. P. TRUEFITT's NEW DIVISION, which combines the durability of the skin with the transparency of the net parting, and perfectly avoids that great objection to ornamental hair, the DARK LINE ON THE FOREHEAD, it being now impossible to discover where the wig commences. This valuable discovery is applicable to ladies' bands, fronts, &c.—114, *Piccadilly; and* 20, 21, *Arcade.* [I 195

BROWN BROTHERS, 165, Piccadilly, Manufacturers. Patent Suspensory Chair, forming Couch or Bed, extremely portable and luxurious, eminently serviceable for invalids, the camp, or drawing-room. [I 47

RICHARD GUNTER'S BRIDE CAKE ESTABLISHMENT, corner of Motcomb and Lowndes street, Knightsbridge. Wedding Breakfasts, Dinners, Balls, and Parties furnished complete, with wines and attendants. [I 30

JAMES LAPTHORN, SAIL-MAKER, GOSPORT.—A Suit of SAILS, on an inch scale, of the Brig Yacht "Anonyma," 450 tons. Also MODEL of same from the Water Line up.
(*See Catalogue.*) [I 116

JAMES TOWNSEND, Manufacturer of every description of AIR GUNS and CANES on the most improved principles, and POWDER WALKING-STICK GUNS in every variety.
11 *and* 12, *Sand-street, St. Mary's-square, Birmingham.* [I 162

JOHN SANDERS, Manufacturer of the PATENT INDIAN RUBBER WATERPROOF UMBRELLA TENT, Registered, 11, Fore-street, Cripplegate, London. Suitable for gentlemen's gardens, lawns, and pleasure-grounds, and to all climates. [I 124

CLASS 28. — SPECIMENS.—GUTTA PERCHA ESTABLISHMENT.—A. THORN and Co., by Appointment, 98, New Bond-street, London. Looking-glass, Picture, and Print Frames, Console Tables, and House Decorations, are now manufactured of Gutta Percha, gilt and ungilt, resembling the finest Wood Carving, which will not break or crack. Inkstands, Card-trays, and many other fancy goods. Also every other article manufactured by the Gutta Percha Company, as at their Works, 18, *Wharf-road, City-road, London.* [I 279

HENDRIE'S PERFUMERY, patronized by the highest Circles for Eighty Years, continues to be favoured by a decided preference. PERFUMER TO HER MAJESTY, 12 and 13, TICHBORNE-STREET, QUADRANT. [I 130
See Catalogue.

RYDE, ISLE OF WIGHT.

HOPGOOD'S CELEBRATED HAIR-CREAM is forwarded to any part of England, in 1*l.* packages, free of carriage. May be had in London of the following Agents: G. W. COURT, 282, Regent-street; J. GOSNELL and Co., 12, Three King-court, City; J. H. DONAGAN, 58, Edgeware-road; and DIETRICHSON and HANNAY, 63, Oxford-street. Communications respecting the hair or scalp answered. [I 278

MR. HAYES, SURGEON DENTIST, 42, ST. MARTIN'S LANE, begs to announce that he supplies every description of Artificial Teeth at moderate charges, and can *only* be consulted at 42, *St. Martin's Lane.* [I 225

ANGLERS of the FOUR QUARTERS of the WORLD visiting LONDON will find the best-selected stock of Fishing-rods, Flies, and Tackle, suitable for their various climates, at JOHN KING FARLOW'S Fishing Tackle Manufactory, 5, *Crooked-lane, London Bridge.* Catalogues of Prices gratis. [I 252

VISITORS TO THE EXHIBITION are respectfully informed that MADAME TUSSAUD and SONS' HISTORICAL GALLERY having been enlarged, by desire of the Public, to double its original size, in honour of the Exhibition, no one need fear paying the Promenade a visit, as both space and ventilation are provided. The Collection, the largest in Europe, consists of 160 Public Characters, and has been established fifty years.

"This is one of the best sights in the metropolis."—*Times.*

Admittance, 1*s.* Napoleon Rooms and Chamber of Horrors, 6*d.* Open from 11 till 10 at night.

BAZAAR, BAKER-STREET, PORTMAN-SQUARE. [I 200

BY APPOINTMENT. — MADAME MICHEL GUIBILEI, Milliner and Dressmaker to Her Majesty, 1, Little Argyll-street, Regent-street, has just returned from Paris with unprecedented Novelties. [1 94

FOR SALE, a fancy ornamental BED-QUILT, designed and worked by CATHERINE FANCOURT, of Grimsthorpe, Bourne, Lincolnshire. Price 50*l.* [1 127

MRS. GIBSON, 50, MORTIMER-STREET, CAVENDISH-SQUARE, Dealer in, Repairer and Cleaner of, all kinds of Lace. Brussels, Honiton, and Point Lace exchanged for Ladies' or Children's Wardrobes; or Wardrobes purchased to any amount.—Every description of Lace-work done on the premises. [1 18

IRISH POPLIN or TABINET. — The ONLY HOUSE for the exclusive Sale of this beautiful Manufacture, so much admired for Ladies' Dresses and Gentlemen's Waistcoats, is ELLIOT'S, removed from Pall Mall to 54, St. James's-street, Piccadilly. [1 108

BENNETT and CO., Manufacturers of UTRECHT or MOHAIR VELVETS, for the decoration of Furniture, lining Carriages, &c. Also PLUSHES and other Worsted goods.—London and Manchester. [1 50

C. and J. DANBY, FRINGE and GIMP MANUFACTURERS, &c., 14, COVENTRY-STREET, and 43, NEW BOND-STREET, beg to call the attention of the nobility and gentry to their extensive stocks of Fringes, Gimps, Tassels, Buttons, Cords, Laces, Bindings, &c., both for Dress and Furniture Trimmings. Every description of the above Goods made to order with accuracy and despatch. [1 140

THOMAS BARTLEET and SONS, FALCON HALL, SILVER-STREET, WOOD-STREET, LONDON, and 126, *Great Charles-street, Birmingham*, WOOLLEN WAREHOUSEMEN, and all articles connected with Men's Mercery; also Manufacturers of Buttons, Needles, &c., in every variety. [1 155

SPLENDID CHINTZ FURNITURES.—GRAND EXHIBITION CHINTZES.—CLARKSON and Co., Her Majesty's Furniture Printers, respectfully inform the nobility and gentry they have now on show their new Spring Stock of Magnificent Chintz Furnitures; some of which have been designed expressly for the Exhibition.—17, COVENTRY-STREET, opposite the Haymarket. [1 185

CAPPER and WATERS, Makers of the CORAZZA SHIRT,

26, *Regent-street, St. James's.*

Shirts of every description, from 3*s.* 6*d.* to 5*l.* each; excellent at 6*s.* and 8*s.* 6*d.* Every recent improvement.

See Catalogue. [1 27

THE REGISTERED POLKA COLLAR.—This COLLAR is the only one really adapted to ONCE-ROUND CRAVATS. — May be had of every respectable Hosier and Draper in the United Kingdom: wholesale (only) of G. R. WOOLGAR, 36, WOOD-STREET, LONDON. [1 142

JOSEPH BRIE AND COMPANY, FRENCH SHIRT MAKERS.

The elegance of French make, combined with the durability of English materials, a desideratum long wished for, has now been satisfactorily obtained by Messrs. J. BRIE and Co.—Wholesale and Retail Establishment, 189, Regent-street.—Good Plain Shirts, from 6*s.* 6*d.* Linen Shirts, from 10*s.* 6*d.* Dress Shirts, from 8*s.* 6*d.* [1 104

RICHARD ATTENBOROUGH, 19, PICCADILLY, begs to call attention to the "PAXTON SPOON" (*see illustrative page)*, and the "ALBANY TEA AND COFFEE SERVICE," both elegant in design, agreeable to use, and yet less expensive than the ordinary patterns. Being registered, they can only be obtained as above. Orders by containing a remittance or a reference, promptly executed. [1 92

THRESHER and GLENNY, HOSIERS TO THE QUEEN, respectfully invite attention to the following Articles manufactured exclusively by them, and which can only be procured at their Warehouse, 152, *Strand*, NEXT DOOR to SOMERSET HOUSE, LONDON.

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THRESHER'S SILKEN-THREAD HOSIERY, a New Material for Summer Wear, exceedingly light, strong, and elastic, particularly adapted for Warm Climates.

THRESHER'S SILKEN-WOOL HOSIERY, a new description of Woollen Hosiery, warranted not to shrink in washing, and extremely thin, warm, soft, and strong.

THRESHER AND GLENNY, HOSIERS, SHIRT-MAKERS, AND OUTFITTERS, 152, STRAND, next door to Somerset House. [1 91

JAMES FRY, GODALMING, SURREY, Manufacturer of FLEECY and other HOSIERY; and of every description of Underclothing for Ladies and Gentlemen, shaped from the frame, in Lamb's-wool, Segovia, Merino, and Cotton. Also, Ladies' Silk and Lisle Thread Stockings of the finest quality, plain and embroidered. [1 77

Rodgers's Improvements in Shirts.

RODGERS'S IMPROVED SHIRT, No. 84.

THESE SHIRTS are cut upon a new and improved principle, which insures a most correct and comfortable fit. Perfect satisfaction (as usual) is guaranteed, or the money returned. The Prices are,

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The Ready-made Stock is the best, the cheapest, and the largest in London, and comprises Shirts of every description.

Superb Dress Shirts (for evening wear) in great variety,

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A Choice of 200 new designs in Regatta and other Fashionable Coloured Shirts,

Six for 20/–, or Six very best for 26/–.

New Patterns, Prices, and Directions for Self-measurement, gratis and post-free.

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AT EXCEEDINGLY MODERATE PRICES.

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(ESTABLISHED 60 YEARS.)

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MANUFACTURER OF
ARTIFICIAL FLOWERS,
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RUE DE CHOISEUIL,
PARIS. [1 302

HATS FOR EXPORT.—TRESS and CO. will, on and after May 1st, 1851, show their New Designs, embodying great improvements, and well adapted for foreign climates, at their Manufactory, CHRISTCHURCH-YARD, BLACKFRIARS-ROAD. [1 191

GRAND EXHIBITION.—Messrs. VYSE, Milliners, and Manufacturers of British and Foreign Straws to the Queen and Royal Family, respectfully announce that they have ready for inspection the FASHIONS for the present year, composed from materials they have deposited in the Exhibition of All Nations. Ladies honouring their Magasin des Modes with their patronage will find a fixed price attached to every article. French and German spoken.—30, *Ludgate-street*, *St. Paul's*. [1 228

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LAURIE'S PATENT FLOATABLE MATTRESSES, PILLOWS, LIFE-BELTS, AND SUNDRY BUOYANT ARTICLES.

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EVERY Ship Mattress will sustain eight persons in the water for an indefinite period, and at a small increase on the usual cost of those in common use. Every pillow or seat-cushion will sustain one or more persons. The LIFE-BELTS are PREVENTIVES to sinking, the cheapest yet submitted, very portable, and applied in an instant in case of accident. Thus, individuals going a long voyage, or a short trip, or yachting, boating, or ferrying, ought to be furnished with one of these various clever Preventives to sinking, which may be seen and tested at the Manufacturers',

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where Passengers may be supplied with the whole or any portion of their Outfit (including Folding Furniture for Cabin and after use) without sacrificing the too usual intermediate profit, SILVER & Co. being the Makers of the manifold articles in the Outfit, and supplying them at their Shipping Prices.

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DRAFTS on AUSTRALIA, 30 days' sight, at par. [1 80

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To order, 24*s.*; wholesale, 21*s.* per pair. [1 184

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GUNS, RIFLES, PISTOLS, AIR-GUNS.—The most extensive and magnificent assortments of Double Fowling Pieces, of every calibre, our own London manufacture, combining all the latest improvements and most superior workmanship, at prices according to finish and exterior ornament, from Ten to Twenty Guineas.—Superb Double Rifles, of the most highly improved construction, accurate sighting and shooting, with round, belted, or cone moulds, included, Ten to Thirty Guineas. Extra Barrels, for shot, fitting in the same Stock, Ten Guineas, being, with case and apparatus, the most portable and complete outfit for India, or any foreign service, at Twenty Guineas and upwards.—Single Fowling Pieces and Rifles, of various calibre, from 2 ounces up to a pea-bullet, suitable for every purpose, at home or abroad, Five to Fifteen Guineas. Trial at our private Shooting Grounds, 300 yards. Pistols, Double and Single, in immense variety, in cases, with apparatus. Most perfect Self-acting Revolvers. Curious Ball-practising Pistols. Improved Air-Canes, from 65*s.* Orders packed and shipped, or forwarded overland, without delay or trouble to purchasers.—Terms, Cash. [1 245

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VICKERS'S GINGER BRANDY.

ON this Article public favour has impressed the stamp of perfection. It is a medicine without nausea, a LIQUEUR exhilarating and beneficial; it is an instant remedy for spasms, and causes nervousness to vanish away.

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8 & 9, Princes-street, Finsbury, London. [1 45

ICE AND REFRIGERATORS

AS SUPPLIED HER MAJESTY.

THE WENHAM LAKE ICE COMPANY'S REFRIGERATOR (164a, Strand, London), under the patronage of her Majesty, the Royal Family, the Nobility and Gentry, the Admiralty, the Honourable Corporation of Trinity House, the Royal Mail Steam-Packet Company, and supplied to Royalty of nearly every nation, is the only Refrigerator that has stood the test in the hottest climates, and realized all that can be arrived at in the preservation of Ice, and cooling and preservation of Articles liable to injury in hot weather.

THE COMPANY'S

PURE SPRING-WATER ICE

is delivered in London daily, and forwarded to all parts of the Kingdom and the Continent, packed in a manner to prevent waste.

MANUFACTURERS OF

WINE COOLERS, ICE CREAM MACHINES,

KNIFE CLEANERS,

AND THE

GLASS ENAMELLED CISTERNS.

DEPÔT FOR

BIRD'S SYPHON FILTER,

the most perfect Water Purifier ever invented; can be adapted at once to any Cistern or Water-butt, and will yield a constant stream of pure water. May be seen in operation and Prospectuses had.

THE WENHAM LAKE ICE COMPANY,

164a, STRAND, LONDON. [1 52

ALLSOPP'S

EAST INDIA and STRONG BURTON ALES.

FOREIGNERS visiting England are particularly requested to ask for these favourite Ales.

The Pale Ales have been long consumed in the East Indies and all hot climates for their highly wholesome and antibilious properties.

The strong Burton Ales (as originally brewed by Wilson and Allsopp) have been celebrated throughout Russia, Prussia, and Germany.

London Stores	. .	61, King William-street, City.
Liverpool	„ . .	Cook-street.
Manchester	„ . .	Ducie-place.
Birmingham	„ . .	High-street.
Scotland	„ . .	33, Virginia-street, Glasgow.

The several Agents at the above places are empowered to give letters of introduction to all respectable Foreigners who may desire to visit the Brewery at Burton-on-Trent. [1 40

GELATINE and GLUE for every purpose, of the purest kind: also Coloured Sheets. Manufacturer, F. Müller, *Hackney:* Agent, J. Maine, 7, Union Court, Old Broad Street, City. [1 93

By Her Majesty's Letters Patent.

G. NELSON, DALE & Co.

14, *BUCKLERSBURY, LONDON,*

AND EMSCOTE MILLS, WARWICK.

Manufacturers of

The Patent Opaque Gelatine,

Patent Refined Isinglass

Perfect substitutes for Russian Isinglass, for all culinary purposes.

Brilliant Gelatine, Gelatine Lozenges,

And every other description of Gelatines.

Extract from Dr. URE'S Testimonial.

"I find Mr. G. Nelson's **Patent Opaque Gelatine** to be at least equal in strength and purity, IF NOT SUPERIOR to the BEST ISINGLASS, for every culinary purpose; it is entirely free from any impregnation of ACID, such as I have found to exist in the OTHER KINDS of Gelatine in the London Markets."

In Packets from **6d.** to **10s.** each.

A Sixpenny Packet makes One Quart of Jelly.

As these Articles will keep in any Climate, they are strongly recommended to Merchants, Captains and others; for exportation, also for the use of the Army and Navy Mess Tables, Club Houses and Hotels.

To be had of most respectable Chemists, Grocers and Oilmen, in the United Kingdom.

Norwich Barracks, 5 March 1851.

Sir,

As I constantly require to use your *Opaque Gelatine*, I have daily more and more admiration at the beauty, the quality, and the economy it possesses.

The Officers of the Regiment have assured me, that they never tasted any thing so delicious as the Jellies, Blancmange, and every thing else which I make from your ingenious Composition; and to have insured the testimony of *their* approval, is indeed much to gain. From my own experience in America, France and England, I have no hesitation in saying that I never found Jellies, &c. appear to have half so much brilliancy, as those I can produce from your *Opaque Gelatine*. The general want of cleanliness in the preparation of Calves' Feet for Jelly, which must leave a dullness in the Jellies, is guarded against by adopting the use of your *Opaque Gelatine*.

Yours very truly,
JULIEN SUZANNE,
Messman 11th Hussars.

Mr. G. Nelson.

[1 85

NEWBOULD & BAILDON,

MANUFACTURERS OF

TABLE, PEN, POCKET, AND SPORTSMAN'S KNIVES,

SURREY WORKS, SHEFFIELD.

SOLE MANUFACTURERS OF

"ROBERTS'S PATENT TABLE KNIVES,"

the handles of which *cannot be injured or loosened by hot water.* They are fastened by means of a dovetail tang, as shown above, without resin or cement of any kind.

N. & B. beg to call attention to their new "Registered" FAST-HANDLE IVORY TABLE KNIVES, which are made without the use of cement, and cannot become loose by being put into hot boiling water. They will be found to be the most durable article ever offered to the public, and may be had of any respectable Cutler or Ironmonger in London or the country. None are genuine unless marked in full NEWBOULD & BAILDON, *Registered, March* 24, 1851, *No.* 2741. [1 274

HARCOURT QUINCEY, BIRMINGHAM and SHEFFIELD AGENT for all descriptions of Export Ironmongery, 82, *Hatton-garden, London*; Patentee of Convex Iron Revolving Safety-Shutters; Corrugated Window-Blinds, in perforated Metal; common Oil-Lamps, with China Cones; Folded Paper Lamp and Candle Shades; and of the 1851 Pedestal Coal Sieve. [1 227

IBBOTSON BROTHERS & Co.,

SHEFFIELD, ENGLAND,

MANUFACTURERS OF EVERY DESCRIPTION OF

STEEL AND FILES

FOR ENGINEERING PURPOSES; ALSO

RAILWAY SPRINGS, SAWS, EDGE-TOOLS, SCYTHES,

CUTLERY, AND MACHINE KNIVES;

AND

GENERAL MERCHANTS.

CORPORATE MARK—" GLOBE."

Agent in London,

Mr. W. H. MAYBURY, 38, WALBROOK, CITY.

Office in New York, 218, PEARL STREET. [1 178

JOHN WILSON & SON,

SYCAMORE-STREET, SHEFFIELD,

The original Manufacturers of Shoe Knives, Butchers', Bread, Cooks', Curriers', Farriers', Glaziers', Palette, and Weavers' Knives, Butchers' Steels, &c. &c.,

DEEM it right to apprise their friends *that not only does their Mark continue to be* PIRATED *both in this Country and on the Continent*, but that certain unprincipled persons, who are deterred from striking the said Mark only from a fear of being visited with legal proceedings, have resorted to *another mode of imposition*, and, IN ORDER TO EVADE THE LAW, are vending Articles marked

I. Wilson, only; or, Wilson
Refined Steel

or, Wilson
Warranted or, Geo. Wilson.

In each case *omitting the Corporation Mark.*

OBSERVE.

All Knives, Steels, &c., of John Wilson and Son's Manufacture, are stamped with their Corporation Mark, "*Four Peppercorns and a Diamond,*" thus ✤◆, in one of the following forms:—

I. Wilson
✤◆

✤◆ I. Wilson
Refined Steel

✤◆ I. Wilson
Warranted

✤◆ I. Wilson
Shear Steel [1 210

BRITANNIA WORKS, SHEFFIELD.

BROADHEAD AND ATKIN,

PATENT ELECTRO SILVER-PLATERS & GILDERS,

MANUFACTURERS OF

Electro Plate, British Plate, Anglo Plated and Britannia Metal Goods. [1 131

THOMAS PORTER, 9, Spring Gardens, Manchester, Commission Merchant for the Purchase and Sale of British, French, German, American, and other Manufactures, Produce, &c. &c. [1 301

THOS. LINLEY & SONS, PATENT BELLOWS and PORTABLE FORGE MANUFACTURERS, 34, Stanley-street, Sheffield. Patentees and Manufacturers of the Double-Blast Circular Bellows; improved Circular, Patent, and improved Portable Forges; and general Manufacturers of Bellows. Warranted superior quality. [1 192

FISHER and BRAMALL (Hoyle Street Works), SHEFFIELD, Converters and Refiners of Steel; Merchants, and Manufacturers of Improved Files, Rasps, Saws, &c.; Importers of Celebrated Marks or Brands of Foreign Irons for making Blister, Cast, Sheer, Sheet, Railway and Coach Spring, and every other description of Steel used for Machinery and Engineering purposes. Approved Circular Saws, of a proper degree of hardness for cutting Axles, Rails, and other iron. [1 273

CAST STEEL.

S. and C. WARDLOW, PRACTICAL STEEL MANUFACTURERS, *Roscoe Field Steel Works, Malinda Street, Sheffield.*—Not having supplied specimens of Steel direct to the Great Industrial Exhibition, we take the present medium of informing the consumers of Cast Steel that a great portion of the finest qualities of Cutlery from Sheffield shown in the Crystal Palace is of our Manufacture. One of the partners having been personally engaged in Refining Steel for upwards of 30 years, we are enabled to guarantee the utmost care and skill to parties intrusting us with orders for the Finer Qualities of Cast Steel. [1 292

JOHNSON, CAMMELL, & CO.,

CYCLOPS STEEL WORKS, SHEFFIELD;

JOHNSON, CAMMELL, & Co., No. 5, BARGE-YARD, CITY, LONDON;
JOHNSON, CAMMELL, & Co., HAMBURGH;
JOHNSON, CAMMELL, & Co., No. 100, WILLIAM-STREET, NEW YORK,

Respectfully solicit Manufacturers, Merchants, and Consumers generally, to inspect the various operations at their Works as above, and the extensive Assortment of Patterns at their London, Hamburgh, and New York Houses.

JOHNSON, CAMMELL, & CO.

have availed themselves of every improvement, and of all the facilities of railway transit, enabling them, combined with their Forges, Tilts, and Rolling Mills, to produce their renowned and universally approved

STEEL;

Namely, Cemented Blister Ⓙ and other Bar; Double-refined Cast Steel; Warranted Double Sheer Steel; Improved prepared elastic Spring Steel, in plane, concave, double concave, and patent ribbed Plates or Bars;
and every other description of Steel used for Machinery, Engineering, Locomotive, and Railway purposes.

JOHNSON, CAMMELL, & CO.,

Manufacturers and Merchants, Importers of the most celebrated Brands of

Russian, Swedish, and other Foreign Irons,

peculiarly adapted, from the purity of their ore, for STEEL PURPOSES, which are Carbonized, Converted, Melted, and Refined at their Furnaces at the CYCLOPS STEEL WORKS.

JOHNSON, CAMMELL, & CO.,

MANUFACTURERS OF FILES,

on scientific and peculiar principles, producing their improved and celebrated quality, long known to the Engineering and Railway world;

INVENTORS OF THE NOW UNIVERSALLY ADOPTED

Curvilinear Tanged Files,

Registered No. 665;

SOLE MANUFACTURERS OF THE

Continuous Tooth Concave and Convex Files,

for which the MEDAL of the Scottish Society of Arts and Manufactures was awarded.

J., C., & Co. beg to observe, that in the Hardening and Tempering of FILES they have adopted such decidedly superior principles as to retain and fix in the Steel the greatest possible amount of Carbon, ascertained by considerable research and numerous experiments in chemical science, aided by those safe and invaluable guides, long practice and great experience.

JOHNSON, CAMMELL, & CO.,

MANUFACTURERS OF SPRINGS

for Locomotive Engines, Tenders, Railway Carriages and Waggons; viz. Bearing, Buffing, Spiral, Patent Bow, Elliptic, Disc, and every description of Springs in use.

In this department the Proprietors respectfully invite Consumers to visit their Works, and inspect the Machinery they have erected for producing exactness and uniformity.

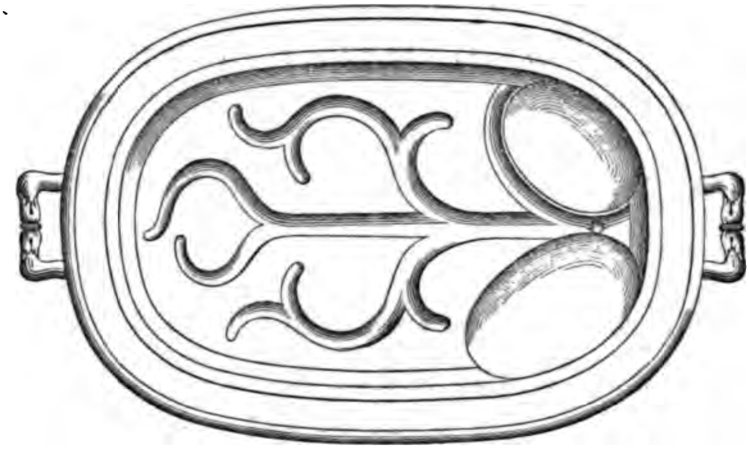
MANUFACTURERS OF

VICES, HAMMERS, SMITHS' AND SHIPBUILDERS' TOOLS, RAILWAY COUPLING SCREWS,

AND ALL USES IN STEEL AND IRON FOR RAILWAY WORKS.

IN THE SEVERAL DEPARTMENTS OF THEIR VARIOUS MANUFACTURES THE CYCLOPS STEEL WORKS STAND UNRIVALLED.
Corporation Marks—the "CAMEL," and "CYCLOPS." [1 255

THE IMPROVED WELL- OR GRAVY DISH,



DULY REGISTERED, IN TERMS OF THE ACT OF PARLIAMENT

Possesses the peculiar merit of **ENTIRELY SEPARATING** *the liquid fat of roasted or boiled meat from the gravy, and of thus rendering* **THE GRAVY** *as it flows from the meat* **AS PURE** *as if the fat had been lifted off it whilst both were in a cold state.*

MANUFACTURED

IN SILVER AND PLATED METAL, by ELKINGTON, MASON, & Co., of Birmingham;
IN BRITANNIA METAL—of which the one in the Great Exhibition is a specimen—by SHAW & FISHER, of Sheffield; and
IN CHINA AND STONEWARE, by MINTON & Co., and some other houses, in the Potteries.

To obtain these dishes RETAIL, *the public will please apply to the respective tradesmen with whom they are in the habit of dealing.*

OPINION OF M. SOYER.—" REFORM CLUB, 10th May, 1850. I certainly consider THE DISH a great improvement and boon for epicures. I shall use it to-morrow for some of the first gourmets in the world, and let you know their opinion. " A. SOYER."

WRITTEN AFTERWARDS.—" THE DISH **was highly approved of.** Two or three of the party would have them. They should be extensively made known by advertisement, **as no epicure would be without one.** " A. SOYER."

DIRECTIONS FOR USE.—Shut the communication between the two Receivers. Dish your meat, place it on the dinner-table, and begin to carve; by which time all the *fat* collected in the first receiver will be floating on the *top* of the gravy therein, whilst the second receiver will be—*and you must see that it really is*—quite empty. Now open the communication between the two receivers, when *the gravy only* will run into the second; which done, *again shut* the communication between them, until *another accumulation* of gravy and fat, flowing from the meat, shall have taken place in the first receiver, when again proceed to separate them as before. The *only* caution of any kind requiring attention being, not to OVERFILL the first receiver, and thereby to OVERFLOW the fat into the second. EXHIBITED BY THE INVENTOR, JOHN GRAY.

Edinburgh, *No.* 11, *Inverleith-row*, *March*, 1851. [1 158

JOHN & CHAS. RATCLIFF & Co.,

PATENT ELECTRO PLATERS

AND

GILDERS,

SUFFOLK-STREET WORKS,

BIRMINGHAM,

AND

ARUNDEL-STREET, SHEFFIELD.

The experience gained by J. & C. R. & Co. in carrying out an extensive Electro business during several years enables them most confidently to recommend its adoption by the *Trade* generally: by no other known process can those classic and elaborate designs hitherto confined to silver and gold be supplied, nor can *perfect* colour and clearness of surface be effected but by their patented improvements.

All Depositions made by J. & C. R. & Co., whether of Gold, Silver, Copper, or Brass, on German Silver, Britannia Metal, Iron, Steel, &c., they guarantee to be perfect in adhesion, colour, and durability, and at prices to meet the particular market of every manufacturer. [1 271

TIMOTHY SMITH & SONS, BRASS FOUNDERS and Manufacturers of Solar, Argyll, Carcel, Boat, and Ship Lamps, Pillars, Candelabra, Gas-Lamps, Chandeliers, and Mountings generally.—HARCOURT QUINCEY, *Agent*, 82, *Hatton-garden, and at Birmingham.* [1 282

MARTINEAU and SMITH, Manufacturers of Patent and other Cocks of all descriptions. Also of House, Turret, Ship, and Hand Bells, &c.—HARCOURT QUINCEY, *Agent*, 82, *Hatton-garden, and at Birmingham.* [1 283

ROBERT SMITH and CO., GENERAL FACTORS for all descriptions of Export Ironmongery, &c., for the Home or Foreign Trade. HARCOURT QUINCEY, *Agent*, 82, *Hatton-garden, and at Birmingham.* [1 284

IRON CRANES.

STOTHERT, RAYNO, and PITT, Ironfounders and General Engineers, invite the attention of parties requiring Cranes to the one exhibited by them in Section 5. The numerous orders received for all sizes from Government, and the New Dock Companies and Railways, home and foreign, show the estimation in which they are held. Estimates given for all kinds of Railway Fittings, Steam, Gas and Water Work.—Newark Foundry, BATH. [1 176

KITCHEN RANGES and VENTILATING STOVES.—BROWN and GREEN'S PATENT RANGE is a certain *cure for a Smoky Chimney*, and for Economy, Cleanliness, and Convenience in Cooking is unrivalled. Their Self-acting Cottage Range, with Oven and Boiler, at 18s. 6d. each, and their Improved Ranges, with Patent Ovens, are strongly recommended. The Patent Portable Suspension Stove consumes the least Fuel, gives a genial warmth, and thoroughly *ventilates* the apartment; it is the cheapest of any, and is suited for Bedrooms, Nurseries, Halls, Schools, Libraries, Greenhouses, Chapels, Churches, &c.—Manufactory, *Luton, Beds*; Wholesale Agents, R. W. KENNARD and Co., 67, *Upper Thames-street, London.* [1 249

CHARLES FARROW,

IRONMONGER, SMITH, BRAZIER, TINMAN, AND GAS-FITTER,

Manufacturer of Machines, Tools, and Utensils for the Wine and Spirit Trade,
18, GREAT TOWER-STREET, LONDON.
(*See Illustrated Catalogue.*)

WROUGHT-IRON WINE-BINS AND SCANTLING.

Copper Measures, Pumps, Cranes, and Funnels.
Corking Machines. Stools, Boots, Drivers, and Floggers.
Masterman's Patent Bottling Apparatus and Corking Machine.
Bottling Pliers and Wires. Braces and Bits.
Bung and Cock Borers.
Coopers' Adzes, Drivers, Beak Irons, and Hammers,
Chisels, Punches, Flagging and Chincing Irons.
Haunches, Shive Vices, Ticklers, Corkscrews of all kinds.
Frets, Nippers, Marking Irons. Shot, Shot Rakes, Cork Drawers.
Shives, Tits, Spiles. Bung Tins, Tacks, Nails, Hamper Cord.
Sampling Irons. Oil Searchers. Glass Tubs and Spitting Pans.
Betts' Patent Metallic Capsules. Stocker's Patent Beer-Engines.
Automaton Funnels with self-closing Valves.
Bottling, Racking, and Screw Cocks. Electro-Plated Cocks.
Brand Irons, for casks and corks. Stanfoil Plates, Ink, and Brushes.
Bottle Seals, with shifting centres. Sealing Wax. Tinfoil.
Wax Furnaces, Cement Pots, and Stoves. Filtering Bags and Irons.
Bottle Gauges, Bottle Sinkers, and Bottle-Washing Machines.
Cellar Lamps, Oil and Cotton. Cellar Candlesticks, in great variety.
Wood Cans, Cellar Tubs, and Bottling Trays. Bottle Guards.
Velinchers, Filling Cans, Waste Pots, Champagne Knives.
Bin Laths. Slate, Porcelain, and Painted Bin Labels.
Glass Velinchers and Syphons. Porcelain Funnels and Tap Troughs.
Leather, Indian Rubber, and Patent Woven Hose Pipes.
The Registered "Porte Flacon" or Wine Handle.
Bottle Carriers, or Portable Cellarets.

MONTEBELLO'S CORKING MACHINE.

(*See Illustrated Catalogue.*)

This machine, the invention of the Marquis Alfred de Montebello, of the firm "Duc de Montebello," Mareuil-sur-Ay, Champagne, obtained a prize at the French Exposition of 1844, as may be seen from the following:—

Extrait du "Rapport du Jury central sur l'Exposition des Produits de l'Industrie Française en 1844," *tome* 2, *page* 839.
M. Montebello (Alfred de) au Château de Mareuil-sur-Ay (Marne), et à Paris, Rue Laffitte, 17.

"M. de Montebello a présenté un appareil d'une extrême simplicité destiné au bouchage des bouteilles. Cette machine, exempte de tout engrenage et ressort, agit à l'aide d'un contrepoids qui maintient la bouteille, d'un levier qui ouvre et ferme plus ou moins un cône creux, sorte de virole brisée, enfin d'un boulon à tête arrondie qu'il suffit de pousser pour faire pénétrer, dans le goulot de la bouteille, le bouchon allongé et rétréci entre les viroles du cône creux.

"On évite ainsi de tordre et de rompre la tête des bouchons; il en résulte une économie notable, et un service plus facile et plus prompt. Aucune altération n'est à redouter dans les organes d'un méchanisme aussi simple.

"Pour un perfectionnement sur lequel la pratique a déjà prononcé, le jury central décerne à M. de Montebello une médaille de bronze."

C. Farrow has much pleasure in referring to the annexed letter from the inventor to his correspondents in London:—

"Château de Mareuil-sur-Ay, Feb. 6, 1848.

"Dear Sirs,—I am gratified by Mr. Farrow's approval of my Corking Machine, and you may give him my full permission to make and sell as many as he can. I have little doubt but that it may prove as useful in England as we find it in Champagne. Herewith I send you the published proceedings of our last 'Exposition,' when the medal for this machine was decreed to me. A full specification of it is there given, which you may let Mr. Farrow copy.

"I am, dear Sirs, with known regard,
"Your obedient humble servant,
"ALFRED DE MONTEBELLO.

"*Messrs. Richard Symonds & Son,*
"2, *Ingram-court, Fenchurch-street, London.*" [1 96

GARNKIRK WORKS, NEAR GLASGOW.

THE GARNKIRK COAL COMPANY,

MANUFACTURERS OF

FURNACES for SMELTING IRON, GLASS, &c., and SMALL FIRE-BRICKS for MALLEABLE IRON WORKS—for home sale and exportation.

Fine selected and prepared CLAY for Glass-house Pots, Crucibles, &c.

Also, ORNAMENTAL VASES and FOUNTAINS, to stand any climate, salt glazed TUBES for Water and Sanitary purposes.

From the great extent of the Works, large Foreign orders can be speedily fulfilled. Nearly Eight Millions of Fire Bricks are manufactured annually.

Office, 5, CATHCART-STREET, GLASGOW.

February, 1851. [1 79

BIDDULPH, JOHN, MANAGER.

CWM AVON

IRON, COPPER, AND TIN-PLATE WORKS.

IRON.—**Railway Bars, Angle, Tyre, and Knee Iron, Cable, and all other descriptions of Bars, Bolts, Sheets, Boiler-plates, and ("Glamorgan") Canada plates.**

TIN PLATES.—Tin, Tole, and Terne Plates.

COPPER.—Tiles, Cakes, and Ingots.

Naphtha, Limesalt, Sugar of Lead, &c. &c., also manufactured here.

All Orders to be addressed as above.

The character of these Works for the superiority of their Tin, Tole, and Terne Plates has been established for thirty years, and the quality of the Canada Plates, Sheets, Cable Iron, and Railway Bars, having been submitted to the most severe tests by eminent Engineers, is admitted to be equal to any manufactured in South Wales. [1 44

TURNIP AND GRASS SEEDS.

J. MORRISON and SON, NURSERYMEN and SEED FARMERS, MONTCUFFER, ABERDEENSHIRE, and of BANFF, BANFFSHIRE, SCOTLAND, continue to execute orders for their celebrated GOLDEN YELLOW and other Turnip Seeds; as also GRASS SEEDS for Lawns and Pastures. [1 15

M. WEDLAKE and CO.'s NEW MACHINE for Cutting Straw into Chaff, and Bruising Oats, at same time or alternately, 42*s*. Plough Turnip-cutter; Oil-cake Breakers; Haymaking Machine; Horse Hay-rake; Chaff Machine; Bean Mills; Gorse or Furze bruising Machine; Subsoil Plough; Seed and Manure Drills; Dressing or Winnowing Machines; Flour Mills; Threshing Machines; Scarifier or Grubber; Seed Machine; Iron Field-Roller; Barley Machines; Smut-cleaning Machines; Scotch Carts; Waggons; Harrows; Horse Hoe; Churns.—Liberal discount for cash.—On receiving six stamps, an illustrated list in English (1*s*. in French, Italian, or German) will be sent.

118, *Fenchurch-street.* [1 182

PATENT MACHINES for PLANING, MOULDING, MORTISING, TENONING and BORING, either in hard or soft wood, which entirely supersede hand-labour for these purposes and make superior work at a greatly reduced cost. They are suitable for and used by Carpenters, Joiners, Builders, Coachmakers, Railroad Carriage and Waggon Builders, Cabinet Manufacturers, Pianoforte-makers, Engineers, &c. &c.

These very valuable Machines have been used in constructing the Exhibition Building, the Houses of Parliament, St. George's Hall, Liverpool, and also by the Honourable Board of Ordnance at the Woolwich Dockyard, and by most of the first Builders, Engineers, and Machinists in the Kingdom, which is considered a sufficient guarantee of their great utility, simplicity, and worth.

Sold by the Patentee,

WILLIAM FURNESS,

20, LAWTON STREET, LIVERPOOL, and at the GREAT EXHIBITION BUILDING, where all the Machines may be seen in daily operation. [1 82

DR. ARNOTT'S STOVE.

OF the many new plans and devices that have from time to time been brought before the Public for Warming Rooms and Buildings, it may be said that not one in point of efficiency and economy has come up to the ARNOTT STOVE;—not the so-called Arnott Stove, that has been as extensively abused as manufactured by various makers in the trade, but the Stove made upon the original simple and sound principles of Dr. Arnott; which, with the addition of the improvements made by the Doctor about eight years since, has become established as the most serviceable and efficient invention for Warming that the Public have yet seen. The peculiar advantages which the Stove possesses may be just stated. The temperature of the heat diffused by the Stove is comfortably warm and uniform, rendering every portion of the place perfectly and equally agreeable. There is very little trouble connected with the management of the Stove: it only requires replenishing with fuel twice in the twenty-four hours. The cost of the consumption of fuel is exceedingly moderate—more so, indeed, than that of any other Stove, especially considering the amount of heat diffused.

The Stove has been manufactured and in extensive use for many years in all parts of the country, and the truth of its superiority has become incontrovertibly tested: an evidence of which is in the large number of testimonials which F. E. possesses from parties who have had several years' experience with the Stove. One or two will here be presented:—

From Messrs. S. Courtauld, Taylor, *and* Courtauld, *Bocking, Essex, and Carey-lane, Cheapside, London.*

"Bocking, Oct. 17, 1850.

"Sir,—Absence from home and many pressing engagements have prevented our replying to your letter before. In respect to the Arnott Stove, we have no hesitation in saying that we consider it very far superior to any other description of close stove we have ever seen, when so constructed as to carry out Dr. Arnott's principle; and we have pleasure in stating that your Stoves on this principle, of which we have had several in constant use through many winters, seem exceedingly well made, and have given us great satisfaction.

"We are, Sir,
"Your obedient servants,
"S. Courtauld & Co.

"Mr. F. Edwards."

From the Rev. Dr. Brown, *Chepstow.*

"Chepstow, Aug. 17, 1850.

"Sir,—After trying various Stoves, said to be of Dr. Arnott's invention, all of which were more or less imperfect and unsatisfactory, I was directed by Dr. Arnott to those made by you. For about six years I have had your Stoves in use during the winter months, and have found them, for economy of fuel, cleanliness, safety, saving of time, and equality of healthy delightful temperature, all that I had looked for. Hence I have recommended Arnott Stoves, as made by you; and continue to recommend them to my friends with greatest confidence.

"I remain, Sir,
"Your faithful servant,
"T. J. Brown.

"Mr. F. Edwards."

F. Edwards has models for 40 different sizes and patterns of Arnott Stoves.

A prospectus containing full particulars, with list of prices and sizes, &c., with some testimonials, to be had on application.

DR. ARNOTT'S CHIMNEY VENTILATING VALVE.

The attention of the Public has been of late much drawn to the subject of Ventilation; and Dr. Arnott's VENTILATING VALVE is becoming universally applied as the most complete and efficient means that can be adopted to effectually ventilate rooms. But while great advantage has arisen through the use of Dr. Arnott's Ventilator, many persons have met with great disappointment through having purchased articles which, through being imperfectly made, have become a nuisance by admitting smoke into the room, instead of being an absolute benefit. This misfortune has arisen through many in the trade (and some of them most respectable parties) having taken up the Ventilator, and have not fully understood, or have not paid sufficient attention to, its construction. The Public can only rest assured that they are having perfect articles by applying to F. Edwards, who has paid much attention to the Valve, and is the party who has made them under Dr. Arnott's immediate direction. In most of the public buildings in London the Valve has been extensively applied, and carried out by F. Edwards with the greatest success. He has also put up many thousands in the private residences of all classes; and he has always found it to give universal satisfaction. Prices from 6*s.* to 35*s.* Prospectuses, with particulars and prices, to be had on application.

SMOKEY CHIMNEYS, NO CURE, NO PAY

With many years' experience in every branch of his business, F. Edwards is enabled to undertake the Cure of Smoky Chimneys on the above satisfactory terms, estimates for which would be previously given.

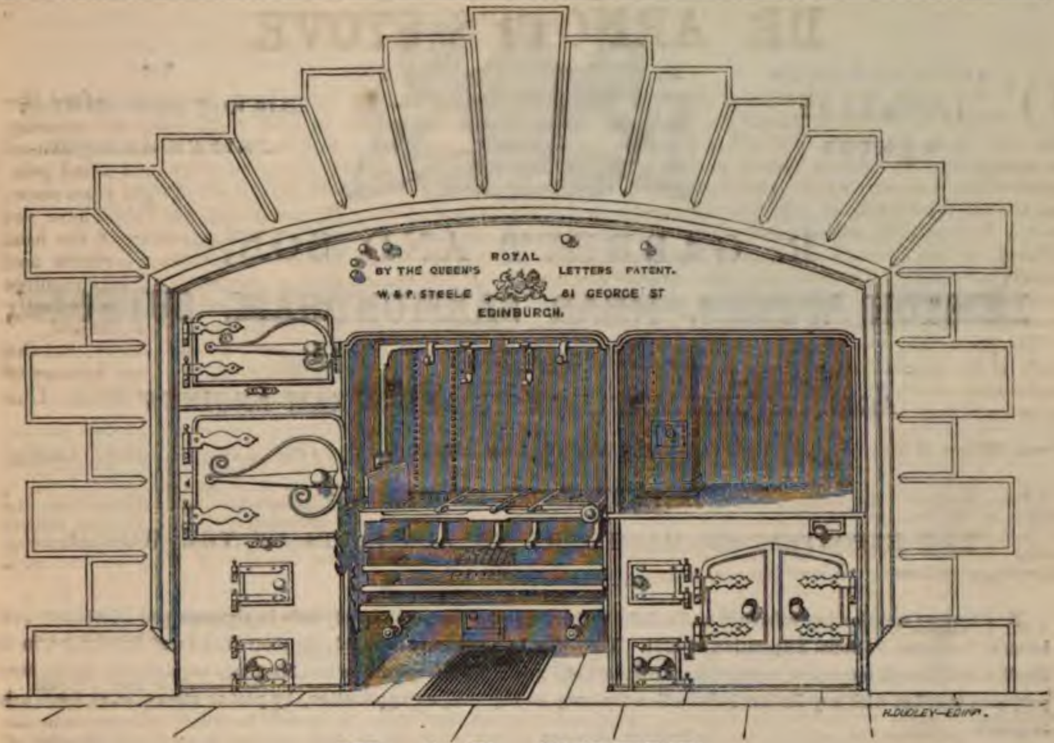
Parties furnishing houses would find it much to their advantage to purchase their Stoves and Kitchen Ranges of F. E., as all that are sold by him are fitted up in the most perfect manner, relative alike to the principles of radiation and economy as to the prevention of any chance of the escape of smoke.

FREDERICK EDWARDS,

STOVE-MAKER TO HER MAJESTY,

42, POLAND-STREET, OXFORD-STREET, LONDON.

(*See Exhibition Official Catalogues.*)


BY THE QUEEN'S ROYAL LETTERS PATENT.
W. & P. STEELE 61 GEORGE ST EDINBURGH.
H.DUDLEY—EDINR.

W. & P. STEELE,

MANUFACTURING AND FURNISHING IRONMONGERS TO THE QUEEN;
Patentees and Manufacturers of Improved Kitchen Ranges, Bath, Heating, and Culinary Apparatus, Stove Grates, &c.;
61, GEORGE-STREET, EDINBURGH.

IMPROVED KITCHEN RANGES.

By the QUEEN'S *Royal Letters Patent granted to*

W. & P. STEELE, of 61, GEORGE-STREET, in the city of Edinburgh, for IMPROVEMENTS in KITCHEN RANGES for CULINARY PURPOSES, and APPARATUS for RAISING the TEMPERATURE of WATER for BATHS and other uses.

The PATENTEES beg leave to state that many of their PATENT RANGES are now in full operation; and wherever the Apparatus has been put up, it continues to give the most unbounded satisfaction. The Patentees have had the honour to receive several very flattering letters from families of distinction, for whom Ranges have been fitted up, bearing testimony, in the most unqualified terms, as to the EFFICIENCY, USEFULNESS, and ECONOMY in the CONSUMPTION OF FUEL, by the use of the Patentees' Improved Apparatus.

The Patent Range is constructed in all its parts on Scientific Principles, and contains ample Range Bars for Roasting and Boiling, with one or more Ovens, and a SPACIOUS BOILING-TABLE or HOT HEARTH—all of which are fitted up on the principle of PERFECT VENTILATION. A large Boiler in the Range affords a constant and ample supply of Hot Water, and is suited to Cook by Steam; also, APPARATUS WHICH GIVES THE POWER OF HEATING A RESERVOIR of Water at the Top of the House, one hundred feet more or less above the level of the kitchen, from which Reservoir HOT WATER can be distributed all over the house, and by means of which A BATH MAY BE GOT READY FOR USE AT A MOMENT'S NOTICE, during any hour of the day, or even at midnight, in cases of sudden indisposition. Means are also provided for effectually and speedily CLEANSING OUT THE BOILERS, without further trouble to servants than merely turning one or two stop-cocks, so that Hot Water may at all times be had FREE of SEDIMENT AND PERFECTLY PURE. The whole is effected BY ONE OPEN FIRE, before which Meat may be Roasted in the usual manner, besides effecting a saving of at least Half the Quantity of Fuel used in apparatus of ordinary construction.

The above Culinary Apparatus is therefore confidently recommended to public notice as the best and most economical Range at present in use, and will be found admirably adapted for the *Mansions of Nobility and Gentry*, Club-houses, Hotels, or other similar establishments.

A Prospectus, containing a fuller detail of the Range, may be had, and every information furnished, on application at the Patentees' Works, No. 61, George-street, Edinburgh.

Plans furnished for all the requisite Fireplaces and Fittings in the Culinary, Still-room, Laundry, and Bath-room departments, or for the supply of Hot Water for Bath-rooms and other domestic purposes throughout the mansion. Alterations, Erections, and general arrangements connected therewith, superintended by one of the Partners in town or country.

Warming and Ventilating of Mansions, Dwelling-houses, Conservatories, &c., on an improved principle, by Hot Water or Heated Air.

W. & P. S. manufacture every description of Improved Culinary Apparatus, including KITCHEN RANGES, with or without Boilers and Ovens; SMOKE, WATER, and WIND-UP JACKS of Improved Construction; BOILING TABLES, with or without Grilling Stoves and Hot Press. Steam-cooking Apparatus in sets or single. Hot Closets, Charcoal Tables, &c.

W. & P. STEELE'S extensive stock includes many very beautiful designs in Drawing-room, Dining-room, and Parlour Grates, &c., fitted up as Registers, or as Kinnaird Grates, so much recommended for Curing Smoky Vents and throwing out Heat, together with every requisite in General Ironmongery. HOUSE FURNISHING, all of first-rate quality, and moderate in price.

W. & P. S. beg also to state that, from their long experience and extensive practice in every department of House Furnishing, they are enabled to execute all orders intrusted to their care in the most prompt and satisfactory manner.

Experienced Workmen sent to any part of the United Kingdom. Country Orders promptly attended to.

Self-heating, Plunge, Shower, Vapour, Nursery, and Chamber BATHS in great variety.

AGRICULTURAL
IMPLEMENT
MAKERS

TO
HIS ROYAL HIGHNESS
PRINCE ALBERT.

R. GARRETT AND SON,

LEISTON WORKS, NEAR SAXMUNDHAM, SUFFOLK,

MANUFACTURERS OF

AGRICULTURAL IMPLEMENTS AND STEAM ENGINES

OF EVERY DESCRIPTION,

IRONFOUNDERS, ENGINEERS,

AND EXPORTERS OF MACHINERY TO ALL PARTS OF THE WORLD.

R. Garrett and Son beg reference to the Official Catalogue for descriptions of their Implements and Machinery exhibited at the Great National Exposition of 1851. They will have pleasure in supplying their Illustrated Catalogues, in the English and French languages, containing particulars and prices of all Implements and Machines required for Agricultural purposes, together with any further information that may be required, on application, by post or otherwise, at the Works, as above.

All implements delivered carriage-free to London, Hull, or Newcastle-on-Tyne, or to any station on the Eastern Counties Railway.

Implements packed and shipped from any port in England for abroad. *(See Catalogue.)* [1 137

PHŒNIX IRON WORKS,

NEAR STROUD, GLOUCESTERSHIRE.

JOHN FERRABEE AND SONS,

ENGINEERS, MILLWRIGHTS, MACHINISTS, IRON AND BRASS FOUNDERS, AND MANUFACTURERS OF AGRICULTURAL IMPLEMENTS,

UNDERTAKE THE CONSTRUCTION AND ERECTION, IN THE BEST STYLE, OF

STEAM ENGINES,—Boilers and their appendages, Cast and Wrought Iron Cisterns and Tanks.

WATER WHEELS.

MILL GEARING,—Cast and Wrought Iron Shafting; Couplings; Spur, Bevil, and Mitre Wheels; Hangers, Pedestals, Fixings, Drums, Strap Wheels, &c.

CORN-MILL WORK,

Mill Hursts and Stones, Flour Machines, Smut Machines, Separators, Dusters, Meal and Corn Worms and Elevators, Hoisting Tackle, Mill-stone Provers and Picks, Iron Sack Barrows, &c.

MACHINES FOR THE MANUFACTURE OF WOOLLEN CLOTH,

Carding and Scribbling Machines, Spinning Machines (Mules), Power Looms, Fulling Stocks, Iron Washer Rollers, Iron Boiling Rollers & Cisterns, Gig Mills, Shearing Machines, Brushers, Grinding Machines, Indigo Mills, Hydraulic Presses, &c.

MACHINES, PUMPS, TOOLS, ETC.,

Leather Levelling Machines, Carpet and Hearth-Rug Shearing Machines, Hot-water Apparatuses, Lifting and Force Pumps, Circular-saw Benches, Cranes, Crabs, Windlasses, Lifting Jacks, Fan Blowers, Lock-gate Paddle Winders, Cart and Waggon Arms, Cart Axles, Screw Wrenches, Strap Punches, Strap Screws, Straps, &c.

AGRICULTURAL MACHINES AND IMPLEMENTS.

An improved and complete system of Machinery for Thrashing and Dressing all kinds of Corn, the whole of which may be worked in combination so as to deliver a perfectly clean and uniform sample of grain into the sacks at one operation, or the thrashing and dressing may be performed separately; Patent serrated Knife Machines, for cutting chaff or litter; Grinding Mills, with Stones made from French Burrs; Corn Crushers, Oil-cake Breakers, Turnip Cutters, Iron Ploughs, Subsoil Ploughs, "Ducie" Cultivators, Wrought-iron rhomboidal Harrows, Land Rollers, Presser and Clod-crusher Rollers, Horse Hoes, Haymaking Machines, Cast-iron Pig and Water Troughs, Mangers, Hay Racks and Pillars for Corn-rick Stands, One-horse Carts, Wheels and Axles for Carts.

BUDDING'S PATENT MOWING MACHINE,

for Lawns, Pleasure-grounds, Bowling-greens, &c. J. F. and Sons *have manufactured and sold between* 3000 *and* 4000 *of these Machines—a conclusive proof of their utility.* Messrs. Ransomes and May, of Ipswich, are the sole wholesale Agents for the sale of them in London and the Eastern Counties. [1 122

R. W. WINFIELD,

CAMBRIDGE-STREET WORKS, BIRMINGHAM.

PROPRIETOR OF THE ORIGINAL PATENT FOR

METALLIC MILITARY BEDSTEADS;

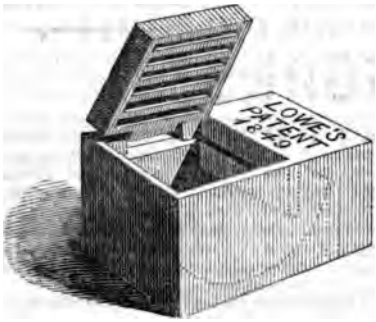
Patentee and Manufacturer of others upon improved principles; also Manufacturer of Brass Desk, Pew, Organ, and other Railing; Window Cornices, Patent Curtain Bands and Ends; Glass Cornice Rings; Locomotive Railings and Mouldings; Brass and Zinc Name Plates for Shop Fronts; Sash Bars and Window Guards; Candle Chandeliers and Sconces; Patent Tubes, by the New Patent Process, whether Taper or Double; Picture, Pulley, Curtain, Wardrobe, and Stair Rods, Astragals, and Beading; Window Fronts, Mouldings, Plates, and Guards; Balustrades; Fire Screen Stands and Arms; Bonnet, Hat, Cloak, and Umbrella Stands; Brass and Iron Reclining and other Chairs; Gas Chandeliers, Pillars, Branches, and Fittings of all kinds; Tubing of every description, rough and finished; Brass and Copper Wire, and Rolled Metals.

SHOW ROOMS:

Cambridge-street Works, Birmingham; London, 141, Fleet-street; and Brussels, Corr Vander Maeren & Co.

R. W. WINFIELD'S Show Rooms contain Specimens of his Patent Metallic Military, Travelling, and House Bedsteads, so much in use at Home and Abroad; with many other Articles of Furniture in Brass, Bronze, Or-molu, and imitation of Silver; together with Gas Fittings of every Description, and a variety of other Articles of his Manufacture. The Portable Bedsteads are admirably adapted for use in the Camp, or for Travelling; and are also well suited for Officers in the Army and Navy. [1 291

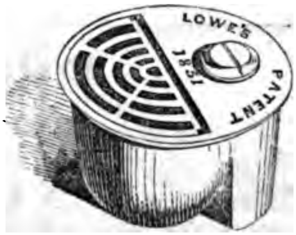
SANITARY IMPROVEMENTS.



LOWE'S

PATENT

EFFLUVIA-TRAP GRATINGS,



FOR

PUBLIC SEWERS, AND DRAINS IN HOUSES, WORKS, YARDS, COURTS, PASSAGES, CELLARS, AND SINK-STONES.

Patronized and used at the Model Cottages in Hyde Park (opposite the Exhibition Building) now being erected for His Royal Highness Prince Albert, under the direction of Henry Roberts, Esq., F.S.A., Honorary Architect to the Society for the Improvement of the Condition of the Labouring Classes.

The advantages of the Effluvia-Trap Sewer Gratings, over the Bell, Syphon, Flap, or Drop Traps, consist in their combining, in a simple, cheap, and compact form, *a Sewer or Sough Grating, an Effluvia-Trap, a Sediment-Trap,* and *a Vermin-Trap, all together;* they are the only Effluvia-Trap which can be cleansed without allowing the effluvia to escape.

***The simplicity of their construction, their general applicability, the ease with which they are examined and cleansed, their solidity of form and durability, perfect efficiency and cheapness,* recommend them to the notice of Corporations, Architects, Surveyors, Builders, Contractors, the Trustees of Public Hospitals and Institutions, and all persons interested in the Sanitary Improvement of Towns, and to the Occupiers of all Houses where the Drainage is connected with the Main Sewers.**

Upwards of twenty thousand of the Patent Grids are now in use by the Corporations, Surveyors, Commissioners of Sewers, or Local Boards of Health, in London and the principal Cities and Towns in the Kingdom.

THE NUMBERS, SIZES, WEIGHTS, AND PRESENT PRICES, IN CAST IRON, ARE AS FOLLOW, viz.—

	In.		In.	In.	Weight.	£.	s.	d.
No. 1 Size,	30	by	18;	– 16 deep,	about 5 cwt.	2	5	0
No. 2 ,,	20	by	12;	—13 ,,	about 2 cwt.	0	17	6
No. 3 ,,	14	by	9;	— 9 ,,	about 1 cwt.	0	10	0
No. 4 ,,	11	by	7;	— 7 ,,	56 lbs.	0	7	6
No. 5 ,,	9	by	5½;	—5½ ,,	25 lbs.	0	4	9
No. 6 ,,	6½	by	4;	— 4 ,,	10 lbs.	0	3	6

No. 7 Size (for Sink-stones), viz.—	s.	d.
In Iron	2	0
In White Metal, with Brass Top	2	9
All Brass	3	6
Round Pattern, all Brass, with screw plug to open in case of the stoppage of the pipe	3	9

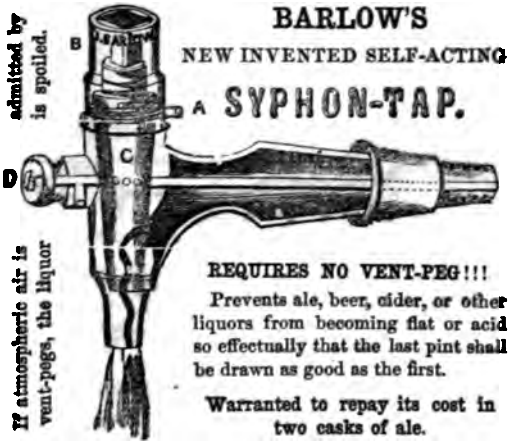
Any larger or intermediate sizes made to order, with either square or round bottoms, flat, concave, or convex tops, with or without flanges, and also with combined horizontal and perpendicular gratings. *The usual trade allowance to Ironmongers; and a liberal discount to Corporations, Local Boards of Health, Contractors, and Architects.*

Licensed Makers in London:—R. W. KENNARD and Co., 67, Upper Thames Street.

Wholesale Agent, London:—W. K. WHYTEHEAD, Civil and Mechanical Engineer, 69, Cornhill.

Printed Lists of Testimonials and further particulars forwarded on application.

Salford, Manchester, April 12th, 1851. (*See Catalogue.*) A. LOWE and Co., *Patentees.* [1 294



BARLOW'S
NEW INVENTED SELF-ACTING
SYPHON-TAP.

If atmospheric air is admitted by vent-pegs, the liquor is spoiled.

REQUIRES NO VENT-PEG!!!

Prevents ale, beer, cider, or other liquors from becoming flat or acid so effectually that the last pint shall be drawn as good as the first.

Warranted to repay its cost in two casks of ale.

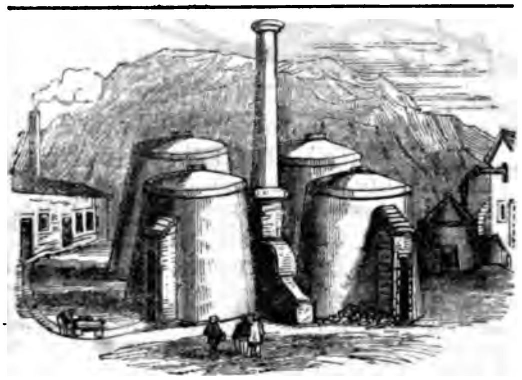
Price 4s. 6d., or sent free to any part of England (if two are taken) at 5s. 3d. each. Ditto, electro-plated, much used for Sherries, &c., on tap, 8s. 6d. each.

The above engraving will explain its action. When the loose key is fitted on the top of the plug C (which has a hole opposite the air-tube H), sufficient air rushes through it into the cask to cause the liquor to run off freely; when the tap is turned off no more air can enter.

JAMES BARLOW,
14, KING WILLIAM-STREET, MANSION-HOUSE.
ESTABLISHED 1820.

None are genuine except stamped with his name and address.

N.B.—This tap is the most simple and least liable to get out of order of any yet invented. [1 126



RIDGWAY'S
PATENT KILNS,
FOR BURNING
POTTERY, BRICKS, TILES, &c.,

COMBINE ECONOMY of FUEL with the production of first-rate goods, at a reduced loss and less cost in wear and tear. The construction differs materially from that of the old kilns. There is only one fireplace, which is beneath the kiln: the heat ascends by means of a central tube and the internal walls; and, as there is no opening at top, descends, thoroughly burning the goods, and passing off by wall vents. The smoke is consumed, the management easy; and when built in pairs, or sets of four, the spare heat passes from one to the other, thereby still further increasing the saving.

For particulars apply to Mr. RIDGWAY, Gauldon-place Wharf Staffordshire Potteries. [1 134

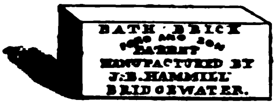
CROSSKILL'S WHEEL AND MACHINE WORKS.

NEW ILLUSTRATED CATALOGUES may be had (per post) on enclosing six penny postage stamps.

Address—MR. CROSSKILL, BEVERLEY. [1 138

BELL and BLACK, 15, BOW-LANE, CHEAPSIDE, LONDON, Manufacturers of WAX VESTA MATCHES, CAMPHORATED ROUND WOOD and new PATENT CONGREVES, warranted not to be affected by climate, time, or exposure to damp.—Beware of spurious imitations. [1 73

PATENT BATH

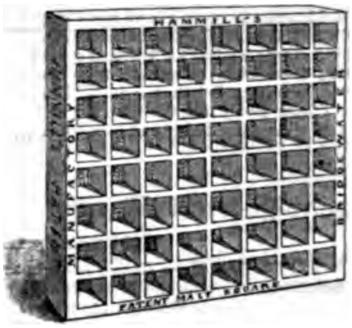


SCOURING BRICKS,

R. FORD & SON'S PATENT; AND

PATENT MALT-KILN TILE,

MANUFACTURED BY
J. B. HAMMILL,



BRICK, TILE, & TIMBER
WORKS,
BRIDGEWATER.

J. B. HAMMILL'S PATENT.

N.B.—*Foreign Orders punctually executed.* [1 222

GAS COOKING STOVES.

THIS superior method of Cooking being now generally recognised, Messrs. GRIGG and JENKINSON have devoted much time and expense to bring forward an apparatus embracing all the excellences and requirements of a complete GAS COOKING STOVE. It accomplishes to perfection *Roasting*, *Baking* (of Meat, Bread, Pastry, &c.), *Boiling*, or *Broiling*, and can be had either with or without a Boiler. If with a Boiler, steaming or warming any part of the house by hot-water circulation can be effected, or a warm bath had instantaneously, without additional trouble or expense. They are made of various construction, so as to meet the means and uses of all classes; and the prices range from a very low scale upwards.

The Public are respectfully invited to inspect the Stove in operation every day at the Manufacturers',

GRIGG & JENKINSON,
FINSBURY IRON-WORKS,
119 & 120, BUNHILL-ROW. [1 98

REGISTERED IMPROVEMENTS IN STOVE GRATES.—PIERCE'S newly invented PYRO-PNEUMATIC STOVE GRATE, the UNIVERSAL FIRE-LUMP GRATE, which requires no fixing, being made in one entire piece, having capacious and safe hobs, strong octagon-shape bars, and double table-bar trivet.

Also PIERCE'S IMPROVED COTTAGERS' GRATES, for warming two rooms with one small fire.

The above are the BEST AND CHEAPEST Grates for all useful purposes ever submitted to public notice, and are most strongly recommended by the entire public press.

Prices, from 11*s.* 6*d.* *to* 30*s.*

Prospectuses and every information afforded at the Warehouse and Manufactory, 5, JERMYN-STREET, REGENT-STREET.

Detailed particulars of the above improvements will be found in the body of this work. [1 205

JOHN & SAMUEL SMITH,

SPINDLE AND FLYER

MANUFACTURERS,

OF SUPERIOR QUALITY, FOR

SILK, COTTON, WORSTED, AND FLAX,

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YORKSHIRE. [1 172

H. BOOTH & CO.,

PRESTON, LANCASHIRE,

MANUFACTURERS OF MULE SPINDLES,

ROVING, THROSTLE, AND FLAX SPINDLES AND FLYS, &c.

A Mahogany Case (*see Catalogue*) containing Specimens of Mule Spindles, Throstle Spindles and Flys, &c.

H. BOOTH & CO.

are permitted to refer to the Spindles in the Spinning-mules of

Messrs. HIBBERT, PLATT, and SONS, Oldham,

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Messrs. PARR, CURTIS, and MADELEY, Manchester,

NOW AT WORK IN THE EXHIBITION,

Amounting to 1642 Mule Spindles, all made by H. B. & Co.

They have also permission to refer to some of the largest Firms in

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INCLUDING

Messrs. HORROCKSES, MILLER, and Co., Preston,

Who have about 100,000 Mule Spindles at Work, all made by H. B. & Co.

AND THE

RUSSIAN COTTON-SPINNING MANUFACTORY, ST. PETERSBURGH, &c. &c. [1 228

Light, Cheap, and Durable Roofing.

CROGGON'S PATENT ASPHALTE ROOFING FELT

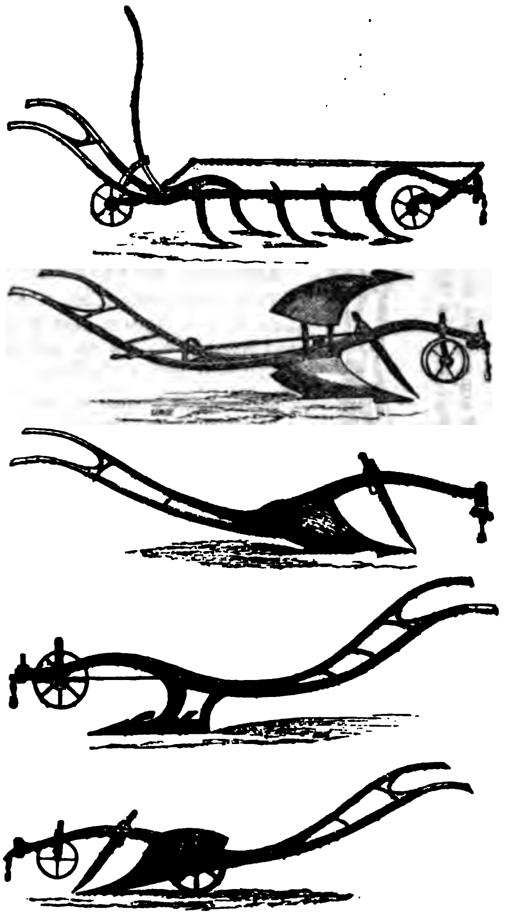
is perfectly impervious to Rain, Snow, and Frost, and has been tested by a long and extensive experience in all climates. Saves half the timber required for slates; can be laid on with great facility by farm servants or unpractised persons. *Price, 1d. per square foot.*

CROGGON'S PATENT NON-CONDUCTING FELT,

FOR STEAM BOILERS AND PIPES,

Saves 25 per cent. of Fuel.

Samples and Testimonials sent by post on application to Croggon & Co., 2, *Dowgate-hill, London*, who also supply Ship-Sheathing Felt, and Inodorous Felt for Damp Walls, &c. (*See Catalogue.*) [1 243



J. WILKIE & Co.,

AGRICULTURAL IMPLEMENT MAKERS,

UDDINGSTON, near GLASGOW.

Agents in London, Messrs. Bartrum and Pretyman, Upper Thames-street. [1 253

W. P. STANLEY, AGRICULTURAL IMPLEMENT MAKER, Peterborough, has for disposal 3 Brass Chandeliers for Candles, 2-Tier high, 6 Lights in each Tier, 4 feet by 4 feet; one Chandelier as above, with 16 Lights, 4 feet 6 inches; eight Chandeliers as above, with 8 Lights each, 3 feet 6 inches. The above are modern, in good condition, and suitable for a Church or Chapel. [1 215

CHAMPION PRIZE

TILE, PIPE, AND BRICK MACHINE

OF THE

ROYAL AGRICULTURAL SOCIETIES OF ENGLAND (1850), SCOTLAND, IRELAND,

North Lancashire, Great Yorkshire, North Staffordshire, &c.,

combining the practical advantages of the Vertical and Horizontal principles of working in one machine—least draught, most rapid and greatest scope of manufacture, as proved by Dynamometer. Vide *Jour. Roy. Ag. Soc. Eng.*, Dec. 1850.

Also PRIZE PUGING MILLS, DRAINING TOOLS, and Implements, of

H. CLAYTON, PATENTEE,

SECTION 2, CLASS 9, STAND No. ,

where full particulars may be obtained, and at the Manufactory, Atlas Works, Upper Park-place, Dorset-square, London, where the machines *may be seen in operation* daily, from 10 A.M. to 4 P.M.

Price of Machines from £13. (See Catalogue.) [1 119

DUTTON & CO., RUNCORN, CHESHIRE,

MANUFACTURERS OF SCHOOL SLATES,

FOR HOME USE AND EXPORTATION. [1 31

NEW and WONDERFUL PORTABLE GAS-LIGHT.—The Patentee has invented a Self-generating Gas Apparatus, producing a light of surpassing power and brilliancy, which, for economy and utility combined, has never yet been equalled.

This extraordinary Lamp, without wick or glass, is constructed to generate Gas from a cheap liquid, by a self-acting and simple process, producing a PURE BRILLIANT LIGHT, equal to the BEST GAS-BURNER, at the small expense of one farthing per hour. Can be carried about with perfect safety, and the light can be increased or reduced at pleasure by a stop-tap.

The tenacity of its flame renders it peculiarly available for Shops, Railways, Places of Worship, Mills, Streets, Booths, Market-stalls, Stables, Dye-houses, Breweries, Inns, Workshops, Schools, Steamers, Ships, &c. Its superiority over every other description of Lamp is beyond comparison, both in cost, simplicity of management, and quantity of light.

Though 20,000 have been sold the first winter, it still has the merit of novelty and utility; and is well worth the attention of Gas-fitters, Lamp-dealers, &c.

The original cost of Holliday's Apparatus, patented 1850, is from 6*s*. each (complete) and upwards, according to size and ornamental embellishments. It requires no connection to pipes or meters, thus avoiding the first expense of gas-fittings, and the misunderstandings which frequently take place between gas companies and gas consumers. The new Lamp is free from smoke, smell, or danger, and will burn for 14 hours *without attention*. In short, its cheapness, its utility, its brilliancy, and its simplicity of management, at once combine to render the invention one of the greatest acquisitions and triumphs in this department of modern science.

To be seen in every style, as well for the cottage as the mansion, and prospectus with engravings had, at READ HOLLIDAY and Co.'s Works, HUDDERSFIELD, and 128, HOLBORN-HILL, LONDON. [1 190

HYDRO-EXTRACTOR, OR CENTRIFUGAL DRYING MACHINES.

MANLOVE, ALLIOTT, AND LEYRIG, PATENTEES,

LENTON WORKS, NEAR NOTTINGHAM.

THESE MACHINES are made to revolve at great speeds, and the centrifugal tendency thereby imparted to the materials intended to be dried causes the moisture contained therein to be nearly instantaneously extracted, without heat, wringing, or strain of any kind, so that the very finest fabrics that can be manufactured are not in the least injured by the process. The introduction and use of these Machines have caused very great improvements to be made in many of the most important branches of Manufactures, and almost every day develops new and valuable applications of their principle of action. They are now considered indispensable to Bleachers, Printers, Dyers, Silk-throwsters, Woollen Manufacturers, and in finishing fabrics of almost every description, and are also applied with great advantage to the extracting of moisture from Starch and other crystalline and drainable substances. The Machines have also been applied with great success to the cleaning of Wool, Corn, or other substances, by passing water through the wool or other substance whilst in the Machine, previous to the drying operation, when the great force given to the water by the action of the Machine is by centrifugal tendency caused to pass with immense speed through the materials, and thus carries away with it all impurities. The Machines are adapted to work by hand as well as by steam-power, and have been found most economical, safe, and invaluable for the use of Baths and Washhouses, Laundries, Asylums, Hospitals, and Union Workhouses, as by their use the wear and destruction of clothes produced by ordinary wringing is entirely avoided. For Asylums and Workhouses the remark made in reference to cleaning Wool applies with great force, as the clothes are thus entirely freed from all impurities, some of which can scarcely be removed by any other process. Further particulars may be had from the Patentees, who are the sole makers of the Machine.—Address, MANLOVE, ALLIOTT, and LEYRIG, *Lenton Works, Nottingham.* [1 209

COWLEY and JAMES, MANUFACTURERS of PATENT WELDED WROUGHT-IRON TUBES, and every description of GAS-FITTINGS, CHANDELIERS, &c. Sole makers of Cowley and Hickman's Patent Metallic Bedsteads.—WALSALL, STAFFORDSHIRE; London Warehouse, HATTON-GARDEN.—JAMES MELROSE, Agent.

(*See Catalogue.*) [1 78

THOS. LAMBERT & SON,

PATENTEES of the Flexible Diaphragm and High-pressure Valve Cocks, Equilibrium Ball Valves, and Self-acting Water-closets.

Manufacturers of Hydraulic, Gas, and Steam Fittings; Tin, Lead, and Composition Pipes.

SHORT-STREET, NEW CUT, LAMBETH, LONDON. [1 63

HAYWARD TYLER & Co.'s

MANUFACTORY FOR SUPERIOR

SODA-WATER MACHINES,

ON THE PATENT IMPROVED CONTINUOUS, AND EVERY OTHER PRINCIPLE.

Established 1815, *and since* 1834 *conducted by*

HAYWARD TYLER & Co.,

85, UPPER WHITECROSS-STREET, ST. LUKE'S, LONDON.

Bramah's Original Continuous Principle, with Hayward Tyler and Co.'s Improvements.

No. 1,	Maximum of product	150	doz.	per day.
2,	" "	100	"	"
3,	" "	80	"	"
4,	" "	60	"	"

Hayward Tyler & Co.'s Patent Improved Continuous Principle, with Beam Action.

SINGLE.	—No. 1,	Maximum of product	150	doz.	per day.
	2,	" "	100	"	"
	3,	" "	80	"	"
	4,	" "	60	"	"
DOUBLE.	—No. 1,	" "	300	doz.	per day.
	2,	" "	200	"	"

Hayward Tyler & Co.'s Patent Improved Continuous Principle, with Direct Action.

SINGLE.	—No. 1,	Maximum of product	150	doz.	per day.
	2,	" "	100	"	"
	3,	" "	80	"	"
	4,	" "	60	"	"
DOUBLE.	—No. 1,	" "	300	doz.	per day.
	2,	" "	200	"	"

These Patent Soda-Water Machines are warranted superior in workmanship to any hitherto manufactured, and for solidity of construction, power, and simplicity, stand unrivalled. They are admirably adapted for exportation, as they could be packed in one case without taking them to pieces, and can be set to work, and Soda-Water made from them, in an hour after arrival at their destination.

Every other description of Soda-Water Machines, Improved Bottling Machines, Cylinders and Pillars for Soda-Water Fountains, &c. &c.

Diagrams sent to any part on application at the Manufactory.

To prevent disappointment and loss by the substitution of inferior and pirated imitations of their Machines, Hayward Tyler and Co. beg respectfully to request particular attention in copying *the Address*, 85, UPPER WHITECROSS-STREET, LONDON.

Extract from an Unsolicited and Spontaneous Report of the Working of one of Hayward Tyler and Co.'s Machines.

"*Bombay, Aug.* 31, 1850.

"The Double Soda-Water Machine which we got from you through Messrs. E. and Co. is still working beautifully, and has never required the least repair, though in constant use for upwards of four years, and left almost entirely to the management of natives." (*See Catalogue.*)

Hydraulic Presses, Steam Engines, &c. [1 241

BRYMBO COAL (on the Admiralty list) is considered to be the largest and finest that can be obtained in Great Britain. It is shipped with despatch from Birkenhead, on the River Mersey (where the largest-sized ships lie afloat), and at Saltney, near Chester, at very moderate prices.

Fire Clay and Bricks, of a very superior quality, also on sale.

BRYMBO COLLIERY, Wrexham, North Wales.

Offices in Liverpool, 2, *Sweeting-street, near the Exchange.* [1 199

HORSES' FEET.—CHERRY'S (*Her Majesty's principal Veterinary Surgeon*) Elastic Stoppings for Horses' Feet have stood the test of 25 years' experience, and their usefulness in supporting and preserving the Feet of Horses has led to imitations that are deficient in the most essential properties. The original efficacious Stoppings have the Inventor's name branded on them, and are made only by Ward, Saddler, *Queen-street, Cheapside*, Manufacturer of every description of Saddlery, Harness, &c. &c., at the lowest possible prices. [1 248

FIRST-CLASS STEAMERS FROM HULL to Hamburgh, Antwerp, Bremen, Kampen, Yarmouth, Goole, and Gainsbro'. Also to London thrice a-week, at reduced fares; and to Copenhagen and St. Petersburg during the season. Inquiries by post, addressed to Brownlow, Pearson, and Co., General Forwarding Agents, Hull, will have prompt attention. [1 6

BELFAST and the NORTH OF IRELAND *viâ* FLEETWOOD.—The Royal Mail Steamers "Prince of Wales" and "Princess Alice" leave Fleetwood for Belfast every Monday, Wednesday, and Friday Evenings, after the arrival of the 10 a.m. Train from London. See *Bradshaw's Guide*, p. 120; or apply to

KEMP & Co., *Fleetwood.* [1 206

ELECTRIC TELEGRAPHS

OF ANY KIND, and of very Superior Workmanship, supplied by W. T. HENLEY, Telegraph Engineer, Magnet Manufacturer, and Mechanician, and Patentee of the Magneto-Electric Telegraph, 46, St. John's-street-road, Clerkenwell, London.

W. T. H. undertakes to erect Telegraph Works, in this country or abroad, at a very reduced charge, and, if required, keep them in order; or when Railway Companies or others wish to erect their own Wires, he will supply them with Instruments of first-rate quality, as he has lately done (on Cook and Wheatstone's principle) to the South-Eastern Railway Company, for the Reading, Reigate, and Guildford and Hastings and Ashford Lines—the Telegraph Company being paid for a Licence for using the Patent. W. T. Henley also calls attention to his Magneto-Electric Telegraph, the Patents for which he has assigned to the Magneto-Electric Telegraph Company. This Instrument requires no battery, and is the only Telegraph not affected by wet weather or bad insulation of any kind.

W. T. H. also manufactures Magnets, Magnetic, Magneto-Electric, or other apparatus, of any dimensions; also all descriptions of Clock-work Trains and other Machinery.

Wire, covered with Silk, Cotton, Gutta Percha, or India-rubber, of any size or in any length. [1 260

ELECTRIC TELEGRAPHS.

WILLIAM REID,

ELECTRIC TELEGRAPH ENGINEER,

25, UNIVERSITY-STREET, LONDON,

HAS always on hand a large Assortment of ELECTRIC TELEGRAPH INSTRUMENTS, in various designs, for giving signals and sounding alarums.

Also an extensive stock of materials for erecting POLE and SUBTERRANEAN TELEGRAPHS, consisting of Wire coated with Zinc, Gutta Percha, prepared in various forms, Insulators of the most approved kind in Earthenware, Glass, Gutta Percha, &c.

Patent prepared Wire, for Submarine and other Telegraphs.

W. R., having been engaged in making Instruments and erecting Telegraphs for the last 13 years, is prepared to furnish tenders for the cost of Lines, and erect Telegraphs to any extent with the greatest possible despatch. [1 121

CONSTRUCTION OF RAILWAYS.

RANSOMES & MAY, Ironfounders, Engineers, and Manufacturers of Agricultural Implements, *Ipswich*, and *No. 3, Great George-street, Westminster:* where may be had particulars respecting Barlow's Patent Wrought-iron Railway Turntables and Cast-iron Sleepers; Wild's Patent Turntables and Switches; R. & M.'s own Registered Water-Crane; R. & M.'s Patent Compressed Treenails and Keys, &c., for Railways; Leggett's Queen Printing Press, with self-acting Inking Apparatus.

For Agricultural Implements, and for Turntables, &c. &c., see Official Illustrated Catalogue.

Also their Illustrated Catalogue of Implements and Machines, on application to their London Office as above, or post-free by enclosing Six Postage Stamps. R. & M. call particular attention to their Patent Trussed Beam Iron Plough, marked Y. F. L., price as a swing 2*l.* 10*s.*; and to their new Broad-share, Scarifying, and Subsoil Plough; and their new Seed-dropper, Agricultural Steam-engines, and Thrashing Machines. R. & M. continue to undertake the construction of Railway Bridges, and to supply Cast-iron Girders, Columns, &c. &c.; also the building of Cattle and Goods Trucks. Ipswich is about 69 miles from London by Railway.

INSTRUMENTS D'AGRICULTURE.

RANSOMES et MAY, Ingénieurs, Fondeurs en Fer, et Fabricants des Instruments d'Agriculture, à Ipswich, Angleterre. Avis au public:—On peut obtenir un Catalogue Illustré des Machines et des Instruments d'Agriculture à *No. 3, Great George-street, Westminster*, ou affranchi à tous les Départements de la France, en envoyant une douzaine d'estampes de poste. Ipswich est éloigné de Londres de 28 lieues (environ), partant de Shoreditch, par le Chemin de Fer des Eastern Counties, et y arrivant en trois heures et demie. On peut y aller et revenir le même jour sans se gêner, et on donne des billets de retour pour la journée à prix reduit. Ils fabriquent aussi des

PRESSES À IMPRIMER;

et ils ont à Hyde Park une autre Presse à Imprimer fournie d'une mécanisme à distribuer l'encre, qui s'agit de soi-même. [1 265

COCKERELL and CO.'S BEST COALS ONLY, —always at the lowest Cash Price—PURFLEET WHARF, EARL-STREET, BLACKFRIARS, and EATON WHARF, BELGRAVE-PLACE, PIMLICO. [1 64

HARRISON, AINSLIE, & CO., Newland Furnace, Ulverston, exhibit a Case containing Hematite Iron Ore, from Lindal-Moor Mines, in Furness; analysed by Dr. Sheridan Muspratt, F.R.S.E., and by him certified to contain—

Sesquioxide of iron, 94·97 per cent.	Metallic iron	66 47	per cent.
	Oxygen	28·50	,,
Silica		3·43	,,
Lime		0·71	,,
Moisture		0·24	,,
Loss		0·65—100·00	

Charcoal Pig-iron and Furnace-cinder, from Newland, Buchbarrow, Duddon, and Lorn Furnaces—the only Charcoal Furnaces in Britain. [1 201

PAYNE'S OSBORNE SAUCE

ROYAL OSBORNE SAUCE,

PREPARED by Her Majesty's Chemist in the Isle of Wight, specially patronised by the ROYAL YACHT SQUADRON, is decidedly the best and cheapest Sauce extant, greatly excelling all in extraordinary richness, piquancy, and fine goût. There is none like it for creating appetite, assisting digestion, and imparting relish the most exquisite to fish, game, chops, hot and cold meats, gravies, &c.; and, being quite clear, there is no waste with sediment. *Agent*—Rumsey, 3, *Queen-street-place, Cheapside, London*. Retailed by Sauce-vendors generally.

(*See Catalogue.*) [1 275

NEEDLEWORK.

It is of the first importance to a nation that its requirements should be thoroughly understood; and every stride made towards better government is effected by a new ray of light having penetrated the darkness which originally covered the face of the whole earth. The more civilized a nation becomes, the more diversified are its legislative wants; and that which may with safety be left to adjust itself in the infancy of society, becomes, at a more advanced period, a paramount consideration. This is precisely the case with Needlework at the present day; it is impossible to overrate its importance. Even the boon of a thoroughly satisfactory poor-law must dwindle into comparative insignificance beside an arrangement whereby tens of thousands of paupers would be enabled to maintain themselves without taking one shilling out of the pockets of the public. Class legislation is a word of retort in the mouths of all parties; but when one class seizes upon the labour of its inferior, and, through the overpowering agency of capital, buys up an extensive branch of native remunerative industry, turning tens of thousands of able-bodied and highly artistical producers into poverty-stricken paupers,—when the monopolised trade, far from flourishing under the talismanic influence of capital, yearly deteriorates through the waning energies of the producers,—when the public is robbed by the substitution of an inferior article on demand, and victimised in the shape of poor's-rates to make up for the inadequate wages given to the producers,—when this gigantic evil has entrenched itself, like the wolf in the story of Red Riding Hood, in the very inmost chambers of the houses of the British public,—and whilst the wives and daughters of the land are gathering the flowers that bedeck the pathway of life, the monster is lying carefully concealed under the mantles of fashion upon the beds of indolence, ready to spring forth at an unexpected time and devour the luxurious triflers. Surely it is well to warn the public against the dangerous pet they are fostering in their dwellings; and, however timid the Legislature may be of encountering the insidious foe, every one may hunt it out of their own houses. I believe that the most pressing necessity of this country at the present crisis lies in a satisfactory solution of the problem, How we are to provide work that will afford wholesome food, clothing, and shelter for our increasing population, and yet enable us to compete in the market with our less scrupulous—because less enlightened—neighbours of the world, who are favoured with a better climate? I believe that that which we are advocating for Plain Needlework, viz. the shaking off of unnecessary clogs in the form of investment of capital, or the undue interference of the capital in gold with the capital in time and sinews, lies at the root of the whole matter; but in trades where the assistance of capital is essential, to prevent its present despotism without prostrating its energies is one of the gravest subjects a nation ever had to deal with; yet it must be handled sooner or later. Justice to the capitalist,—justice to the producer,—and justice to the consumer, can alone sweep away from our entire trade the disgrace of the slop system, and banish the cry of starvation from the land. Are our capitalists so honest that not one law needs to cumber the statute-book, providing for the fair remuneration of time? We have laws against usury; and can no usury in labour be wrung from the starving operative? When we hear of a great West or East End House retiring from business with its £100,000 cleared in a few years, it would look well if we heard of some fifty out of the thousand producers of that wealth who were also retiring with a modest competency; but I believe that, could we trace them, we should oftener learn that hundreds of the producers of that wealth have died, or are dying, in the workhouse. Happily for Plain Needlework it has no need of the aid of capital, and it depends on the will of the public to emancipate it from its bondage without legislative interference.

To accomplish this end **A Plan for Registration Offices for Needlewomen** is submitted, the intention of which is to improve their condition and prevent their pauperism by securing to them the profits of their own work. The plan promises the consumer a superior article for his money, and to enable men, without any previous knowledge of the trade, to procure their garments as easily, and with as much economy, as experienced females can do. It also proposes to afford every facility to families in finding suitable needlewomen, either to work by the day or by the piece, and securing them against loss by damaged work or unfitting garments. The expenses of Registration to be defrayed for the first year by subscription. After the public has placed confidence in the Society it will require no pecuniary aid.

The Registration-Book.

To contain the names of Needlewomen alphabetically arranged—their ages, residence, and characters, as attested by the police and others—their qualifications, and whether they are cutters or not. Thus:—

Name.	Age.	Residence.	Character.	Attestation.	Qualifications.
Allwork, Agnes . .	29	Skinner-street . .	Very timid: honest. Keeps an aged aunt.	Police	Slop-sewer; cannot cut.
Bodkin, Mary . .	28	Batty-street . . .	Respectable and honest: judicious in purchasing. Married: 2 children.	Mr. Gentle, Clergyman of Shepherd's Chapel	Fine worker and cutter.
Cutter, Susan . .	18	Holloway-street .	Idle: not to be trusted to purchase. Keeps a young brother.	Mrs. Lumsden, Grocer's wife, Crown-alley.	Pretty good needlewoman: cuts common work.
Darnaway, Rose .	40	19, Garlic-row . .	Honest and respectable: not judicious. Widow: five children.	Mrs. Wise, of Fenchurch-street.	Beautiful worker and cutter.

Book of Patterns and Prices.

Wherein every house in town is invited to enter their patterns of materials, with prices and widths affixed.

Book of Fashions and Price of Work.

Showing the most approved cuts of garments in general use; and these, being reduced to a scale, are sufficiently distinct for all cutters to follow without difficulty. To each drawing is attached a number, and the price of making the garment.

Book of Calculation.

Referring by numbers to the preceding book; thus:—

Shirt pattern No. 5, of linen; height, 5 ft. 10 in.; 2¾ yards . .
¼ yard of cambric for the front . . . .

It is evident that, knowing the quantity of material, the price per yard, and the cost of making, any one with common sense can arrive at the correct estimate of the just price of their garment, without any previous knowledge of the trade.

Estimate of the Expenses of a Registration Office.

Rent of premises, fuel, and cleaning . . . .
Salary of Clerks . . . .
Salary of Matron . . . .
Incidental expenses . . . .

Cutters would have no salaries, but be entitled to a fixed drawback from the price of the work.

When a lady wants a needlewoman, she can suit herself with one from the office without trouble, whether she desires her to cut out the garment or merely to make it,—whether she wishes her to purchase materials or to make them up. She can get a fine needlewoman at four shillings per shirt, or one to do coarse work at one shilling. She can get a trustworthy character; or, if she is willing to run the risk for a hitherto more unsteady fellow-creature, she can give her fewer things at a time and make the Christian experiment. But gentlemen want shirts, and they don't know what stuff they should be made of; they know that the one they have on—a cotton shirt, linen necks and wrists, cambric fronts—cost ten shillings and sixpence at a fashionable shop. The clerk hands the book of patterns; the matron matches the fabric—asks the gentleman's height—says, "Sir, I see by the Calculation-book, to which you can refer yourself (the clerk hands it), your shirt ought to cost so and so, because it takes so and so; have you any preference for a particular needlewoman?" Yes.—No. "Miss Bodkin will do them well; she is unemployed." A stamp sends Miss Bodkin notice; she repays it on being paid for the work. Along with the shirts, when finished, Miss Bodkin must hand the shop bill (paid) and her own. The gentleman, when he gives the order, deposits the money for the materials. When he gets home his shirts he pays Miss Bodkin, who signs a discharge. The gentleman may fairly be said, on the transaction, to save twenty per cent. If he bought shirts formerly of a fashionable shop at 10*s.* 6*d.*, he will now certainly get a superior article for 8*s.* 6*d.*, and, withal, have the satisfaction of improving the condition of the fiftieth part of our population. Supposing the books do not exhibit a trustworthy Miss Bodkin unemployed, Miss Scissors (the cutter up stairs) takes the job in hand, buys the cloth, cuts out the shirts, and subtracts what the Calculation-book allows her for her time from Polly Flighty's pay who does the work.

If the shirts do not fit, the matron passes her opinion upon the alterations required, and the needlewoman must do them. Some work may even be returned altogether for gross mistakes. This must be submitted to the Committee, who decide to what extent the mistake is to lower the recommendations of the worker; but in no case can more than one penny per shilling be subtracted from future wages for a fault of this nature. The Society must in all cases instantly remunerate the loser; but if needlework is lost or burnt, the culprit must refund it. Supposing gentlemen do not choose to come to the office to try on their shirts, a man will be sent to see them on in the mornings or evenings; but the gentleman must pay his time extra—only, he does not pay for the alteration. If a person wants six dozen shirts for an outfit, and he cannot wait more than a certain number of days, the clerk and matron must divide the shirts amongst all the hands for that class of work; and if these prove too few, the better hands whose work in hand is not pushed for must take them, whether they like it or not, to keep up the credit of the establishment. In all such cases the clerk and matron must be cautious of forcing work, and it must be reported to the Committee, and entered in the books. It is obvious the establishment is meant only to suit cash payments, and cannot speculate; but it may undertake export orders, the cloth or price being deposited, if the payment suits the Calculation-book. It is impossible, in the limited space which a page of a Catalogue affords, to enlarge upon the benefits of this system. The aim of introducing the subject here is to give it as much publicity as possible, and, by directing general attention to a plain and practicable scheme, to endeavour to secure the blessing of independence **for those who live by their Needle, and who form the most numerous Producing Class in every Civilized Nation.** [1 250

BELGRAVIA REPOSITORY

FOR

ENGLISH AND FOREIGN FANCY GOODS.

JEWELLERY, Buhl Enamel Goods, Desks, Work-Boxes, Writing Cases, Smelling Bottles, Knives, Scissors, Baskets, Chessmen, Fans, Souvenirs, Purses, Stationery, Papier Maché Goods; Morocco, Walnut, and Ebony Envelope Cases and Blotters; Ladies' Companions and Necessaires, Gold and Silver Pencil Cases, Jet Bracelets, Brooches, &c. Also an extensive Assortment of

Superior English and Foreign Toys,

Including Rocking Horses, Baby Houses, Wax Model Dolls, Mechanical Toys, Games, Dissected Puzzles, Children's Books, Water Colours, &c. &c. At

MILLER'S REPOSITORY,

32, Lowndes-street, Belgrave-square,

Within ten minutes' walk of THE EXHIBITION. [1 46

GREAT WESTERN FURNITURE WAREHOUSES.

J. DENT & Co.,

Cabinet-makers, Carpet & Bedding Manufacturers, Decorators, and General Furnishing Warehousemen, 30, 31, 32, and 99, CRAWFORD-STREET, BRYANSTONE-SQUARE, MARYLEBONE.

SUBSTANTIAL NEW AND SECONDHAND FURNITURE.—Every one in search of really good and cheap Furniture would do well, before purchasing elsewhere, to visit the unequalled spacious GREAT WESTERN FURNITURE WAREHOUSES, by very far the most extensive in the Metropolis (the smallest of which being upwards of 300 feet in length). The proprietors, relying upon a reputation acquired during a period of 25 years, confidently invite the attention of the public to their immense Superior Stock of Cabinet Furniture, Carpets, Upholstery, and Bedding, the whole of which is manufactured of the best seasoned materials, by first-rate workmen, and at one-third the prices usually charged at the west end of the town. Every article is warranted, the price marked in plain figures, and will be exchanged or money returned if not approved of. [1 288

MELNOTTE'S

LADIES' SHOE AND FANCY WAREHOUSE,

23, OLD BOND-STREET, LONDON,
Formerly 114, REGENT-STREET.

LADIES' BOOTS and SHOES, superior ELASTIC and RIDING BOOTS, and a variety of FANCY SLIPPERS; French Silk Stockings, Plain and Embroidered Cambric Handkerchiefs, Fans, Reticules, and Purses of Crochet and other work, and a most varied selection of Imitation Gold, Diamond, and Pearl Bijouterie, and other Parisian novelties.

CHEILLE'S unequalled Paris Kid Gloves kept exclusively. India and Wedding orders executed on the shortest notice. The high-standing reputation of Melnotte's house (established 35 years in London) renders all encomiums superfluous. Specimens to be seen in the French division at the Great Exhibition. MELNOTTE'S, 23, Old Bond-street, London. *See Catalogue.* [I 26

PEAL'S WATERPROOF BOOTS.—CAUTION!—Gentlemen are requested to observe that BOOTS of PEAL'S WATERPROOF LEATHER can only be obtained of the Manufacturer, NATHANIEL PEAL, 11, Duke-street, Grosvenor-square; and that this leather is not, under any circumstances, supplied to the trade. [I 58

MORTLOCK'S,

18, REGENT STREET, NEAR PICCADILLY.
By special appointment to the Queen.

WILLIAM MORTLOCK begs most respectfully to call the attention of the Nobility and Gentry to his extensive assortment of CHINA, GLASS, and EARTHENWARE, comprising every description, both decorative and useful, and particularly adapted for foreign as well as home trade.

18, *Regent-street, near Piccadilly.* [I 13

IF you desire really well polished Boots, use BROWN'S ROYAL MELTONIAN BLACKING. It renders them beautifully soft, durable, and waterproof, while its lustre equals the most brilliant patent-leather. Price the same as common Blacking. Made only by E. BROWN, the inventor and sole manufacturer of the De Guiche Parisian Polish for Dress Boots and Shoes, and Waterproof Varnish for Hunting Boots. *Manufactory,* 25, *Broad-street, Golden-square, London.* Patronized by the Court and Nobility, and to be had of all the principal Bootmakers throughout the kingdom. [I 17

ROYAL VICTORIA FELT CARPETING.

THE PUBLIC ATTENTION is particularly directed to this manufacture. The Carpeting combines beauty of design, durability, imperviousness to dust, and economy in price—costing half that of Brussels. It has now been in general use many years, and become well established with the trade and the public, and can be purchased at all respectable Carpet-houses in London, and in nearly every town of the United Kingdom. The PATENT WOOLLEN CLOTH COMPANY, 8, Love-lane, Aldermanbury, also manufacture Printed and Embossed Table-covers, in the newest designs, Window Curtains, Cloths for Upholsterers, Thick Felt for Polishing, &c. &c.—Manufactories at LEEDS, and BOROUGH-ROAD, LONDON. [I 71

THE PATENT DESICCATING COMPANY invite the attention of the Public to their Drying and Seasoning Process. By it, wood of the finest description can in the course of a few days be more thoroughly seasoned, and rendered less liable to subsequent shrinkage, than if dried or seasoned by the ordinary method of exposure to the atmosphere for six or seven years. The floor of the new Coal Exchange, which is composed of 4000 specimens of twelve different kinds of wood, some of which were growing, and all of which were seasoned, within three weeks of their being used, is adduced in proof of the above statement. The Company's process is very extensively used in Manchester and other manufacturing districts, where clean, uniform, expeditious, and certain drying is required; and it is equally fitted for the finest as for the coarsest kind of goods, and ensures a controllable temperature of any required degree of heat.- Certificates of the successful application of this invention to the drying of Wood, Flax, Paper, Printed Paper, Cotton, Grain, Coffee, Calico, Starch, Wool, Yarns, Fabrics, Wadding, Manure, &c., can be obtained by applying either personally or by letter to the Secretary,

41, GRACECHURCH-STREET, LONDON. [I 156

JEAN MARIE FARINA, COLOGNE, 23, RHEINSTRASSE; LONDON, 1, SALTERS'-HALL-COURT (by 82, CANNON-STREET, CITY); recommends his newly-exhibited EXTRAIT D'EAU DE COLOGNE. 1*l.* per Box of six Bottles (duty paid).—STOCK IN BOND FOR EXPORTATION—

Extrait d'Eau de Cologne	. . .	24/.	per doz.
Double ditto	. . .	9/.	„
Single ditto	. . .	5/6	„
Eau de Lavande (first quality)	. .	9/.	„
Ditto (second ditto)	. .	5/6	„

Orders will be promptly executed to all parts. [I 144

BURY'S ROYAL POMPADOUR POWDER, for daily use, to remove that redness and irritation remaining on the skin after washing, or from any other cause; possessing the most cooling and softening qualities, and imparting an exquisite clearness to the complexion. 1*s.* and 2*s.* 6*d.* per packet; by post for 16 or 38 stamps uncut.

Alfred Bury, Perfumer, Exeter 'Change, London; and sold by perfumers and chemists throughout the kingdom. [I 19

MACKAY'S PERSIAN OIL surpasses all other Preparations in Cleansing, Restoring, Preserving, and Beautifying the Hair. It is agreeable, economical, and effectual. ¼ lb. bottles, 1*s.* 6*d.*; ½ lb. bottles, 2*s.* 6*d.* each. Prepared and sold by JOHN MACKAY, Chemist, 121, George-street, Edinburgh. Wholesale Agent, W. S. RUMSEY, 3, Queen-street-place, London. [I 120

HITCHCOCK & CO., CHYMISTS, of TAUNTON, beg to inform their Friends and the Public generally that the increasing demand for their delicious and permanent perfume "*The Italian Bouquet,*" has rendered it necessary to establish a depôt for its sale in London; it will therefore be always on sale at GIFFORD and LINDER'S, 104, STRAND, where also all H. and Co's., valuable preparations may be obtained.

To those who never used the Italian Bouquet, H. & Co. will only say it really is fully entitled to the name given it by those who have patronized it, as being the "*ne plus ultra*" of perfumes.-Dated, North-street, Taunton, March 1851. [I 177

METCALFE AND CO.'S NEW PATTERN TOOTH-BRUSH, PENETRATING HAIR BRUSHES, and SMYRNA SPONGES.—The Tooth-Brush searches thoroughly between the divisions of the Teeth, and cleans them in the most efficient manner, the Hairs never coming loose.—Penetrating Hair Brushes, with the durable unbleached Russia bristles, and every description of Brush and Comb for the Toilet, only at METCALFE, BINGLEY, and Co.'s, Brushmakers, by special appointment, to H.R.H. Prince Albert, 130B, Oxford-street.- Beware of the word "from" (Metcalfe's) adopted by some Houses.— Metcalfe's Alkaline Tooth Powder, 2*s.* per box. [I 110

A CABINET with SECRETARY and SECRET DRAWERS of BURNT BRITISH WOODS, so disposed as to show the different grades of colour, either for new or old work.—This beautiful and much-admired product has been manufactured at the Wood-carving premises, RANELAGH-ROAD, THAMES-BANK, PIMLICO, where the art has been brought to perfection at an outlay exceeding 40,000*l.* in France and England. The present Proprietor of the Factory, Mr. THOMAS HARRISSON, owned the patent and plant in France, which is now joined to the plant in England, with great additions; and is well worthy the attention of a responsible, competent person to take an interest and the management of the concern. There is a show-room on the premises, under the management of Mr. THOMAS THOMPSON, who designed and produced the above cabinet.

See page in Catalogue for drawing and description. [I 123

THE WORCESTERSHIRE SAUCE, prepared by LEA & PERRINS, from the recipe of a Nobleman in the country, imparts the most exquisite relish to steaks, chops, and all roast meat, gravies, fish, game, soup, curries, and salad; and by its tonic and invigorating properties enables the stomach to perfectly digest the food. The daily use of this condiment has proved most conducive to health, and established its fame throughout the world. Sold wholesale by the proprietors, Lea & Perrins, 6, Vere-street, Cavendish-square; Crosse & Blackwell, Soho-square; and other merchants, London; and retail by the principal dealers in sauces. [I 8

PRIEST'S
EXTENSIVE FURNITURE MART,

Nos. 1 & 2, TUDOR-STREET, WATER-STREET, BRIDGE-STREET, BLACKFRIARS, LONDON.

(See **ILLUSTRATED CATALOGUE.**)

W. PRIEST begs to invite the attention of the numerous visitors to this country and its public in general to his extensive assemblage of Office, Library, and Household Furniture, his being the largest establishment of the kind in this kingdom, where may be found every article suited for the Office, the Study, or the Board-Room. Fire-proof Safes, Doors, &c. Also the greatest assortment of Household Furniture suited to either the Mansion or the Cottage. [I 109

COALPORT, SHROPSHIRE.

EDGE & SON,

INVENTORS AND PRACTICAL MANUFACTURERS OF

FLAT CHAINS FOR PITS,

AND OF

IMPROVED ROUND CHAINS

FOR NAVAL AND MINING PURPOSES,

respectfully call the attention of Proprietors of Mines to the great superiority of their Chains.

Copies of testimonials to their safety and durability, from many eminent firms, may be had on application at their stall in the Great Exhibition, or at the Manufactory. [I 33

R. H. ROGERS,

12 *and* 13, *Prospect-row, Walworth, London,*

IMPERIAL CABINET, GLASS-PAPER, and GLASS-CLOTH MANUFACTURERS, and which is still unequalled in quality, and will be found worthy of the support of all who honour it with their patronage.

Price per ream as follows *(for cash)* :—

20*s*. 18*s*. 15*s*. 13*s*. 12*s*. 11*s*. 10*s*.

N.B.—All orders by post promptly attended to. [I 28

MESSRS. T. HOLLAND & Co.,

LANGHAM FACTORY,

GODALMING, SURREY,

SOLE PATENTEES of FLEECY HOSIERY, so highly recommended by the most eminent physicians, as an article pre-eminently calculated for underclothing, whether in cold countries, or in the uncertain climate of Great Britain.

Original Inventors of LADIES' DRESSES and WAISTCOATS; also of GENTLEMEN'S PANTALOONS and DRAWERS, shaped from the frame.

Manufacturers of every article of Ladies' and Gentlemen's Under-clothing, whether in Fleecy, Segovia, Worsted, Lamb's-wool, Cotton, &c. &c., adapted for wear in every climate.

N.B.—Articles of the above manufacture sold by the principal Wholesale Houses in the City only; and retailed by all respectable Hosiers in all parts. [I 60

SCARBOROUGH.—REED'S ROYAL HOTEL. The above old-established Family Hotel is beautifully situated, commanding an extensive sea view, and possesses every requisite for the accommodation of Visitors to this celebrated Watering-place. [1 238

SCARBOROUGH,

"QUEEN OF BRITISH WATERING-PLACES."

SHARPIN'S CROWN HOTEL,

ESPLANADE,

CONTIGUOUS TO THE SPA, SANDS, CLIFF-BRIDGE, AND PLEASURE-GROUNDS.

Families will find the above extensive Establishment most agreeably situated, commanding a splendid view of the ocean, combining every comfort and convenience.

TABLE D'HOTE AT FIVE O'CLOCK.

BILLIARD-TABLE AND BATHS IN THE HOUSE.

An Omnibus and Cabs at the Railway Station. [1 293

HARROGATE,

THE

METROPOLIS OF BRITISH WATERING-PLACES.

HARROGATE is situated in Yorkshire, within six hours of London, a short distance from York and the far-famed Fountains' Abbey, about equi-distant between the Northern Ocean and the Irish Channel. Its position on a table-land—a great height above the level of the sea—and its dry, sandy, highly-drained soil, combine to render it a peculiarly healthy and bracing residence. It is on account of the benefits which are to be gained from its different celebrated MINERAL SPRINGS and BATHS that Harrogate is chiefly frequented. These springs are many in point of number: as regards their properties and effects, they are no less various. They may, however, be subdivided into five great classes:—

I. *The strong Sulphureous.*
II. *The mild Sulphureous.*
III. *The pure Saline.*
IV. *The pure Chalybeate.*
V. *The Saline Chalybeate.*

The two first classes are valuable, not only in Cutaneous, but also in various Dyspeptic Complaints, in derangements of the Liver, in Gout and Rheumatism, and in some particular cases of Female Disease. In fact, as many or most Cutaneous diseases depend more or less upon one or another of these diseases above named, the cure of the former *(the effect)* is more or less consequent upon the removal of those diseases which are the *cause*.

There are many cases where the third class above mentioned (the pure Saline springs) are highly useful.

It would be out of place in this notice to enumerate the numerous derangements of the system which are benefited by the fourth and fifth classes, viz.—the pure Chalybeate and the Saline Chalybeate. Suffice it to say that the Chalybeate springs are much stronger than most of a similar kind in this country; while the Saline Chalybeate springs are unique in Great Britain, and in point of analysis, as well as in their physiological and therapeutic effects, are closely analogous to the famous Ragozzi spring at Kissingen.

A case may now be seen at the Exhibition of all Nations, containing specimens of some of the principal Waters, with their respective analyses.

It only remains to be added that the accommodation for visitors, both at the hotels and lodging-houses, is of a first-rate description. [1 133

HOTEL DE LILLE and ALBION, in PARIS, 323, RUE ST. HONORE, and RUE DE RIVOLI.—Hotel for Families and Gentry. Baths, Stables, and English Attendance.—The gardens of this Hotel conduct to the Tuileries. [1 187

HOTEL DE FOLKSTONE, 9, RUE CASTELLANE, PARIS; L. OLIVIER, Proprietor.—This establishment, situated in the handsome quarter of the Madeleine, near the Boulevards, the Tuileries, and the Champs Elysées, is specially frequented by English travellers. It is particularly noted for its elegant furniture, good management, cleanliness, and moderate charges. The attendance is made by English servants, and nothing is spared by the Proprietor to render this Hotel one of the most comfortable in Paris. Table d'Hôte at three francs; Bedrooms and Apartments at all prices. Interpreters for all languages. [1 141

THE ISLE OF MAN,

SITUATED in the centre of the United Kingdom (within six hours' sail by steam from Liverpool, five from Fleetwood, seven from Dublin, and twelve from Glasgow), though comparatively so little known as such, is, in most respects,

UNEQUALLED AS A WATERING-PLACE

and Residence. It is exempt from taxation. Its waters are pellucid—sea-bathing unrivalled—scenery magnificent—climate equable and salubrious—Collegiate and Scholastic Establishments excellent—the luxuries and necessaries of life attainable at moderate prices. The Island is well provided with first-rate Hotels and Lodging-houses, excellent Roads, cheap Conveyances, &c.; whilst there are no Turnpikes or Toll-bars to fret the temper of the Traveller on land, nor Harbour Dues to discourage the Yachtsman. To the Capitalist, the Annuitant, and the Valetudinarian a more agreeable, healthful Residence can scarcely be found in Her Majesty's dominions than in this Island. First-class Steamers, carrying Her Majesty's Mails, and commanded by able officers, leave Prince's Pier-head, Liverpool, every morning (Sundays excepted) at eleven o'clock during the summer months; and from Fleetwood, Dublin, and Glasgow, weekly. [1 235

CHELTENHAM,

QUEEN'S HOTEL.

TO FOREIGNERS AND OTHERS VISITING THE EXHIBITION.

THIS HOTEL is situated in the most fashionable part of the town (in the immediate vicinity of the SPAS), and is one of the largest in England, having nearly 100 Bed-rooms, with Sitting Apartments fitted up in a style combining comfort with elegance; and from the retired situation of the Hotel there is no annoyance to visitors from the continual rattle of carriages, &c.; it is therefore admirably adapted for invalids.

It has now been determined to reduce the scale of charges as follows, in order to obtain an extensive patronage from the public:—

	£.	s.	d.
Board and Lodging, Table d'Hôte, per week each	2	7	6
,, ,, in Private Apartments ,,	3	0	0
,, ,, ,, if more than two persons . . . . ,,	2	12	6
,, ,, for a Servant . . . ,,	1	1	0
Dressing-room . . . . ,,	0	7	0
Fires (when required) . . . . ,,	0	5	0
Sitting-room from 42*s*. to 10*s*. 6*d*. per week.			
Beds . . . . per night	0	2	0
Breakfast, with meat or eggs	0	2	0
,, without ,, ...	0	1	6

A MODERATE FIXED CHARGE FOR SERVANTS.

Omnibuses, Flys, Post-horses, Carriages, &c. &c. [1 147

[VICTORIA ESPLANADE AND JETTY, GREAT YARMOUTH.]

GREAT YARMOUTH, NORFOLK.

THERE are few places in the Kingdom which present greater attractions to those in pursuit of health or recreation than the Town of GREAT YARMOUTH. This ancient SEAPORT is placed at the extreme Eastern point of the English Coast, and has long been celebrated for the great purity and bracing quality of the air, which acts as a powerful yet wholesome stimulant to the human frame, whether worn down by care, anxiety, or disease. It has therefore been strongly recommended by the most eminent of the faculty, especially in cases of debility or of paralytic complaints. SEA-BATHING can here be enjoyed in perfection. The Sands are firm and shelving, free from rock and mud, perfectly safe for children, and are the best adapted of any around Great Britain for walking and riding. Great Yarmouth has now become a Bathing-place of great resort; and numerous HOTELS and LODGING-HOUSES, commanding Marine Views of considerable extent and beauty, have been erected, affording suitable accommodation to Families of Rank, as well as for all classes of Visitors, at reasonable charges. The Sea View is unrivalled, and presents an ever-changing Panorama, the charms of which it is impossible to exaggerate, as the number of Vessels which pass through Yarmouth Roads CLOSE INSHORE is greater than on any other part of the Coast, or perhaps of the world; and during the Mackerel Fishery, from April to July, and the Herring Fishery, from September to December, this part of the Coast has a very animated appearance, and the labours of the Fishermen are a constant source of amusement and interest to Visitors; whilst for Marine Excursions, Yawls of a very superior build, combining swiftness with safety, are in constant readiness, and every facility for Boating is afforded by the Rivers Yare, Waveney, and Bure.

The Market is abundantly supplied with Meat, Fish, Poultry, and Game at moderate prices; and Yarmouth is celebrated for its Ale.

The old town of Great Yarmouth is of considerable antiquity, is built on a plan unseen in any other part of the Kingdom, and presents many peculiar features.

The principal objects of interest and amusement in the town and neighbourhood are the Parish Church of St. Nicholas, a magnificent structure of the thirteenth century (where there is a daily service); St. Peter's Church, St. George's Chapel, a Roman Catholic Church, and other places of religious worship; the Column erected to the memory of Lord Nelson; the Jetty extending into the sea, and affording a delightful promenade; the Victoria Esplanade and Britannia Terrace, facing the ocean; the Denes (or Downs) and Race-course, with ample space for equestrian exercise; the Quay, of unequalled extent and beauty; the Royal Military Lunatic Asylum; the Theatre; the Bath and Reading Rooms; Public Library; Gorleston Cliffs and Piers; the Roman Camp, called Garianonum, at Burgh Castle; the ruins of the castellated mansion of Sir John Fastolfe, K.G., at Caister; many curious and highly interesting Churches in the adjoining parishes, some of them with the round towers peculiar to the district; whilst the ancient City of NORWICH, with its Castle, Cathedral, and numerous Churches, is within half an hour's distance by railway.

A MARINE REGATTA will take place in July, and the annual RACES on the 9th and 10th September.

There is a direct Railway and Telegraphic Communication to all the most important towns in the kingdom. Trains leave by the Eastern Counties Railway at Shoreditch, and Steamers leave London Bridge every Wednesday and Saturday (fares—first cabin, 8s.; second, 5s.). The Hull, Newcastle, Leith, Aberdeen, and Inverness Steamers pass weekly through Yarmouth Roads.

The Principal HOTELS *fronting the Sea are*

The VICTORIA, ELLIS, ON THE VICTORIA ESPLANADE;

The BATH HOTEL and LODGING-HOUSE,

BLY, NEAR THE JETTY (WITH PIPES TO THE BATHS DIRECT FROM THE SEA);

The ROYAL HOTEL,

BIRD, SOUTH BEACH (HOT AND COLD SEA-WATER BATHS CONSTANTLY READY);

The NORFOLK HOTEL,

GEORGE BUCKHAM, PROPRIETOR, WINE MERCHANT, NORTH BEACH.

IN THE MARKET-PLACE, **The ANGEL HOTEL,** JOHN BROWNE. [1 304

SPECIMENS OF HOPS (as prepared for Sale by J. M. Paine) of the true Golding Variety, grown at Farnham, upon the Phosphoric Strata of the Lower Chalk Marl and Upper Green Sand. Hops abstract from the soil more phosphoric acid than any other cultivated crop; hence the suitableness of this remarkable soil for their perennial growth. Nearly the whole of Mr. J. M. Paine's extensive Hop Plantations are thus situated.

Agents for sale, Messrs. S. Gibbons & Co., 253, High-street, Southwark. [1 43

Under Patronage of Royalty and the Authority of the Faculty.

KEATING'S COUGH LOZENGES.

A CERTAIN REMEDY for Disorders of the Pulmonary Organs. In Difficulty of Breathing—in Redundancy of Phlegm — in Incipient Consumption (of which Cough is the most positive indication), they are of unerring efficacy. In Asthma, and in Winter Cough, they have *never* been known to fail.

Keating's Cough Lozenges are free from every deleterious ingredient; they may, therefore, be taken at all times, *by the most delicate female and by the youngest child;* while the Public Speaker and the Professional Singer will find them invaluable in allaying the hoarseness and irritation incidental to vocal exertion, and consequently a powerful auxiliary in the production of melodious enunciation.

Prepared and sold in Boxes, 1*s.* 1½*d.*, and Tins, 2*s.* 9*d.*, 4*s.* 6*d.*, and 10*s.* 6*d.* each, by THOMAS KEATING, Chemist, &c., *No. 79, St. Paul's Churchyard, London.* [1 226

WHITE'S SACCHARIZED HYDRATE OF MAGNESIA.

THIS new and elegant Preparation is now offered to the Medical Profession and the Public. After having devoted several years to the preparation of the article, the Manufacturer with confidence, under the sanction of eminent Physicians, introduces it as a mild aperient and corrector of the acid of the stomach. From its agreeable, pleasant taste, it will be found much more palatable than any other preparation of Magnesia. Being most useful for Children, and peculiarly adapted for them, it may be relied on as a perfectly safe remedy in all cases where this medicine may be required. The Manufacturer has received testimonies of the efficacy of this medicine from some of the first Physicians.

Sold in bottles at 1*s.* each.

Agents in London: Barclay and Sons, 95, Farringdon-street; Edwards, 67, Paul's-churchyard; Sanger, 150, Oxford-street; Hannay and Co., 63, Oxford-street; Bell, 338, Oxford-street; W. S. Rumsey, wholesale agent, 3, Queen-street-place. Agents for Ireland: J. G. Boileau and Co., Mary's Abbey, Dublin. [1 203

50,000 CURES by DU BARRY'S REVALENTA ARABICA FOOD, without medicine, inconvenience, or expense (as it saves fifty times its cost in other remedies).—Cure No. 180: "Twenty-five years' nervousness, constipation, indigestion, and debility, from which I had suffered great misery, and which no medicine could remove or relieve, have been effectually cured by Du Barry's Revalenta Arabica Food in a very short time.—W. R. Reeves, Pool Anthony, Tiverton." Cure No. 4208: "Eight years' dyspepsia, nervousness, debility, with cramps, spasms, and nausea, for which my servant had consulted the advice of many, have been effectually removed by Du Barry's delicious health-restoring food in a very short time. I shall be happy to answer any inquiries.—Rev. John W. Flavell, Ridlington Rectory, Norfolk." Cure No. 1609: "Three years' excessive nervousness, with pains in my neck and left arm, and general debility, which rendered my life very miserable, have been radically removed by Du Barry's health-restoring food.—Alex. Stuart, Archdeacon of Ross, Skibbereen." Cure No. 49,832: "Fifty years' indescribable agony from dyspepsia, nervousness, asthma, cough, constipation, flatulency, spasms, sickness at the stomach, and vomitings, have been removed by Du Barry's excellent food.—Maria Jolly Wortham, Ling, near Diss, Norfolk." Copies of testimonials of 50,000 cures (including those of Lord Stuart de Decies, Major-General Thomas King, Drs. Ure, Shorland, and Harvey) gratis. In canisters, with full instructions, 5 lb., 11*s.*; 12 lb., 22*s.* Superrefined, 5 lb., 22*s.*; 10 lb., 33*s.* The 10 lb. and 12 lb. carriage free.—Du Barry and Co., 127, *New Bond-street, London.* [1 273

SIR JAMES MURRAY'S FLUID MAGNESIA.

PREPARED under the immediate care of the Inventor, and established for upwards of thirty years by the Profession, for removing BILE, ACIDITIES, and INDIGESTION, restoring APPETITE, preserving a moderate state of the bowels, and dissolving uric acid in GRAVEL and GOUT; also as an easy remedy for SEA-SICKNESS, and for the febrile affection incident to childhood, it is invaluable.

On the value of Magnesia as a remedial agent it is unnecessary to enlarge; but the Fluid Preparation of Sir James Murray is now the most valued by the Profession, as it entirely avoids the possibility of those dangerous concretions usually resulting from the use of the article in powder.

Sold by the sole Consignee, Mr. WILLIAM BAILEY, of Wolverhampton, and by all wholesale and retail Druggists and Medicine Agents throughout the British Empire,

In bottles, 1*s.*, 2*s.* 6*d.*, 3*s.* 6*d.*, 5*s.* 6*d.*, 11*s.*, and 21*s.* each.

The Acidulated Syrup, in bottles, 2*s.* each.

N.B.—Be sure to ask for "Sir James Murray's Preparation," and to see that his name is stamped on each label *in green ink*, as follows:—"James Murray, Physician to the Lord Lieutenant."

Drugs, Chemicals, Pharmaceutical and Medicinal Preparations of every description supplied to Merchants for shipment on the best possible terms. [1 204

W. CULVERWELL'S
Portable Domestic Vapour Bath,

TO BE SEEN AT THE GREAT EXHIBITION.

It is sold by most Chemists. Tin, 12*s.* 6*d.*; *Copper,* 21*s.*

Ladies and Gentlemen who may be desirous of possessing so valuable a remedial agent as the Vapour Bath is acknowledged to be, are respectfully invited to see the above apparatus in action at

16, CHARLOTTE-STREET, BLACKFRIARS-ROAD,
NEAR ROWLAND HILL'S CHAPEL.

TESTIMONIALS.

"31, *George-street, Hanover-square.*

"I bear willing testimony to the efficacy of Mr. W. Culverwell's Portable Domestic Vapour Bath; and as its price is very moderate, I beg to recommend its use to all those who are in the habit of employing a vapour-bath.

"*December* 31, 1850." "B. G. Babington, M.D.

"I can testify to the advantages that I have seen result from the use of Mr. Culverwell's Portable Domestic Vapour Bath; it has the advantages of being taken in bed, and of enabling the patient to be independent of a nurse.

"John C. W. Lever, M.D.,
"*Physician-Accoucheur to Guy's Hospital.*
"*December* 31, 1850."

"I hereby certify that I have made use of Mr. Culverwell's Portable Vapour Bath, which I consider a very convenient, efficient, and economical, as well as ingenious apparatus, for the medicinal use of steam.

"*St. Thomas's Hospital, Jan.* 3, 1851." "John F. South.

"Having used Mr. Culverwell's Apparatus for the application of warm vapour to the body, I am pleased with its simplicity and efficiency; all the requirements of vapour, simple or medicated, appear to be capable of fulfilment through its means.

"Joseph Moore, M.D.,
"*Consulting Physician to Queen Charlotte's*
"10, *Saville-row, Jan.* 11, 1851." *Lying-in-Hospital.*

"The Vapour-Bath constructed by Mr. Culverwell has been used in the Fever Hospital, and appears to answer every purpose. Its simplicity and easy application are recommendations in its favour.

"A. Tweedie, M.D.,
"*Physician to the London Fever Hospital.*
"*April* 11, 1851."

Testimonials in its favour have also been received from Drs. Barlow and Oldham, J. Hilton, Esq., and J. Stocker, Esq., of Guy's Hospital; H. Hancock, Esq., and J. Avery, Esq., of Charing-cross Hospital; R. D. Grainger, Esq., Lecturer on Physiology, &c.; Dr. Hodgkin; and Dr. Munk, Physician to the Royal Infirmary for Diseases of the Chest, &c. [1 218

EAST INDIA AND COLONIAL AGENCY.

MESSRS. HENRY CASSIN and Co., 9, OLD BROAD STREET, LONDON, act as CONSIGNEES for MERCHANTS, SHIPOWNERS, and others; undertake to procure the English Staples of every description from the most eminent houses in Europe, with whom they are in constant communication; and at the instance of many distinguished members of the East India Company's service, the Agency is available for the supply of Stores for Regimental Messes, Public Institutions, Officers of the Naval, Military, and Civil Services, Native and European Residents.

Messrs. H. C. and Co. continue to receive periodical Consignments of the finest Champagne, Clarets, and German Wines of the most favourite vintages, direct from growers of known repute (the corks bearing the proprietors' brand). They also continue to supply the splendid Cabinet Champagne of Madame V^VE CLICQUOT PONSARDIN; and as especial attention is paid to the corking and packing before leaving the Vineyards, parties in India and the Colonies may confidently rely upon receiving their Wines in perfect condition.

Complete instructions should be given, and all Orders accompanied by a remittance or reference for payment in England.

Insurances effected at Lloyd's, at moderate premiums.

[1 14

CHICORY

in all its stages, from the Raw Root to the Ground Dust, as used in mixing with, and instead of, COFFEE; also

PASTEL, or IMITATION WOAD,

made from the leaves of the Chicory plant, and as used in the Dye Vat for the fastening of different colours in Woollen Cloths.

CHICORY, or "CICHORIUM," a tap-rooted plant of the Endive family, the root of which is largely used as a substitute for COFFEE.

From its medicinal qualities, it is considered a valuable admixture to COFFEE, as it counteracts the astringent effects thereof.

It can also be sold at a much lower price, and, being of home produce, is recommended to the public, in connexion with COFFEE, as a wholesome and nutritious beverage, the consumption of which is now becoming very general. Though formerly believed to be a prejudicial admixture with COFFEE, it is now positively proved to be quite the contrary.

The leaves of this plant are also applicable to the manufacture of a valuable Dye-Stuff called "PASTEL," or "IMITATION WOAD," of which they form a principal ingredient.

This article is very largely used by Wool Dyers, and is a valuable agent in the Dye Vat, for fastening colours in cloths.

The application of this plant to the above joint purposes is of recent date in Ireland. The first of the above-mentioned articles produced from this plant were manufactured and introduced into the English market with success by Mr. PAUL KING BRACKEN, from his manufactory in the neighbourhood of Dublin.

The samples now exhibited were grown and manufactured by ARTHUR HILL GRIFFITH, Esq., Gortmore, Ballymore, County Westmeath, under Mr. BRACKEN'S directions.

Mr. GRIFFITH has established a Factory for the combined produce of CHICORY and WOAD, which is promising to be very successful, and gives very considerable employment to the poorer classes in the vicinity.

As an Agricultural Crop, and one suited to the soil and climate of Ireland, together with the large quantity of labour required for the bringing of these articles to perfection, this plant is considered of great national importance.

In an economic view, the advantages can be ascertained by a comparison of the respective prices of those articles with the present prices of COFFEE and WOAD, neither of which can be produced at double the remunerative prices of CHICORY or IMITATION WOAD, both of which substitutes are in most respects quite as efficient, and some superior to, their originals.

SAUNDERS AND GATCHELL,

EXHIBITORS,

6 & 7, MOUNTRATH-STREET, DUBLIN. [1 298

EUGENE RIMMEL'S PERFUMERY,

Wholesale and for Exportation,

39, GERRARD-STREET, SOHO, LONDON; AND
19, BOULEVARD DE LA GARE D'IVRY, PARIS.

VISITORS to the Exhibition, and more particularly those who consume or deal in PERFUMERY, are invited to inspect the specimens of E. RIMMEL'S manufacture which they will find in the north-east gallery of the building. Price-lists and other particulars may be obtained at either of the Manufactories. E. RIMMEL begs to draw the attention of the Public to the fact that he is the only Perfumer possessing a manufactory in Paris as well as in London, which enables him to combine the well-known English soundness of quality with French taste and modicity of prices; an advantage which cannot fail to be appreciated by all intelligent home and foreign buyers. E. R. will conclude with a short notice of his articles most in repute.

RIMMEL'S TOILET VINEGAR, to supersede Eau de Cologne.

For the Handkerchief.

Rimmel's Exhibition Bouquet.
Rimmel's Jenny Lind Bouquet.
Rimmel's Jockey Club Bouquet.
Rimmel's Ess. Bouquet.
Rimmel's Spring Flowers.
Rimmel's Irrigators of all Perfumes.

For the Complexion.

Rimmel's Serbis des Sultanes.
Rimmel's Crême d'Ispahan.
Rimmel's Cold Cream.
Rimmel's Amandine.
Rimmel's Rose-Leaf Powder.

For the Teeth.

Rimmel's Odontine.
Rimmel's Elixir.

For the Hair.

Rimmel's Exhibition Pommade.
Rimmel's Nutritive Cream.
Rimmel's Castor Oil Pomatum.
Rimmel's Hair Wash.
Rimmel's New Indelible Cosmétiques.
Rimmel's Instantaneous Hair Dye

Improved Soaps.

Rimmel's Illustrated Soaps.
Rimmel's Ladies' Own Soap.
Rimmel's Musk Brown Windsor.
Rimmel's Malaktikon.
Rimmel's Cream of Almonds.

Sundries.

Rimmel's Perfumed Almanacks, Flora's Fountains, Winter Bouquets, &c.

RIMMEL'S ARTIFICIAL HAIR, to imitate Human Hair.

EUGENE RIMMEL,

39, *Gerrard-street, Soho, London;*
and 19, *Boulevard de la Gare d'Ivry, Paris.*
(*See Illustrated Catalogue.*) [1 25

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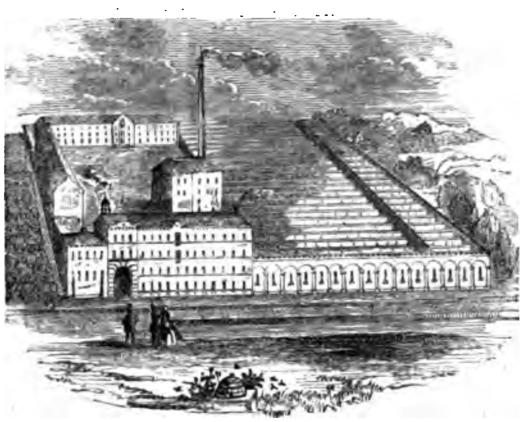

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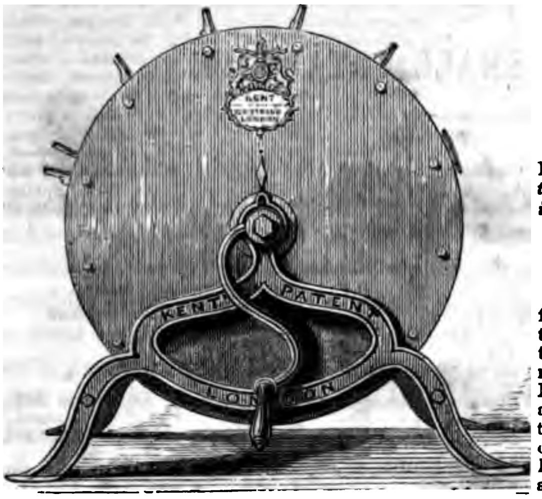
January, 1851. [15



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Bache's Dining-rms., Fenchurch-st
Bank Dining-rooms, Throgmorton-st.
Bath Hotel, Piccadilly.
Bay Tree Tav., St. Swithin's-lane
Bethlehem Hospital
Bedford Hotel, Covent-garden
Betsy's Chop-house, Old Broad-st.
Blue Posts Hotel, Cork-st., Bond-st.
Brett's Hotel, Holborn
Bridge House Hotel, London-bridge
British Hotel, Cockspur-street
Brooks's Club, St. James's-street
Brunswick Hotel, Blackwall
Café de l'Europe, Haymarket
Castle and Falcon, Aldersgate-st.
Castle Tavern, Guildhall
Cathedral Hotel, St. Paul's-ch.-yd.
Cesarini's Hotel, Golden-square
Chequers Tavern, Abingdon-street
Christie's Hotel, St. James's-street
Christ's Hospital, Newgate-street
City Arms Tav., Pope's Head-alley
City of London Club, Broad-street
Clarence Hotel, Aldersgate-street
Clarendon Hotel, Bond-street
Clark's Dining-rooms, Chancery-la.
Clothworkers' Hall, Mincing-lane
Coal Hole Tavern, Strand
Coburgh Hotel, Charles-street, Grosvenor-square
Cock Tavern, Fleet-street
Colonnade Hotel, Charles-street, St. James's
Commercial Travellers' School
Coventry House Club, Piccadilly
Coulson's Hotel, Brook-street
Cox's Hotel, Jermyn-street
Cremorne Gardens
Crown and Sceptre Tav., Greenwich
Dr. Butler's Hd. Tav., Coleman-st.
Deaf & Dumb Asylum, Kent-road.
Dolly's Chop-house, City
Drapers' Hall, Threadneedle street
Drapers' Private Hotel, Sackville st.
Euston Hotel, Euston-square
East India Club, St. James's-square
Edinburgh Castle Tavern, Strand
Elephant and Castle, Newington
Ellis's Hotel, St. James's-street
Erectheum Club, St. James's square
European Tavern, City
Exchange Dining-rooms, Change-alley
Exchequer Hotel, Palace-yard
Exeter Hall Hotel, Strand
Fenton's Hotel, St. James's-street
Fishmongers' Hall, London-bridge
Foundling Hospital
Freemasons' Tav., Great Queen-st.
George and Vulture, George yard
Gerard's Hall Tavern, Basing-lane
Giraud's Hotel, Castle street
Golden Cross Hotel, Charing-cross
Gray's Inn Coffee-house, Holborn
Green Dragon Hotel, Bishopsgate-street
Gresham Club, King William-st.
Gresham Dining-rs., Bucklersbury
Grillion's Hotel, Albemarle-street
Grosvenor Hotel, Park-street
Groves's Hotel, Albemarle-street
Guildhall Hotel, Guildhall
Hanover Hotel, Hanover square
Highbury Barn Tavern, Highbury
Home and Colonial School, Gray's-Inn-road
Horns Tavern, Kennington
Hotel de l'Europe, Leicester-square
Hotel de Provence, Leicester-sq.
House of Commons (*Refreshment Department*)
Joe's Chop-house, Finch-lane, City
John O'Groats Tavern, Rupert-st.
Junior United Serv. Club, Pall-mall
King's Arms Hotel, Palace-yard
Lake's Dining-rooms, Cheapside
Langbourne Coffee-house, City
Law Club, Chancery lane
Leopard Coffee-house, Borough
London Tavern, Bishopsgate street
London Coffee-house, Ludgate-hill
Man-in-the-Moon, King's-road, Chelsea
Mansion House, City
Morley's Hotel, Trafalgar-square
Mercers' Hall, Ironmonger-lane
Mullins' Hotel, Ironmonger-lane
National Club, Palace-yard
Nell Gwynne Tavern, Strand
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Peel's Coffee-house, Fleet-street
Piazza Hotel, Covent-garden
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Prince of Wales Hotel, Leicester-pl.
Pultney Hotel, Albemarle-street
Queen's Hotel, Cork-st., Bond-st.
Queen's Hotel, Post-office
Rapp's Private Hotel, Golden-sq.
Reform Club, Pall-mall
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PROVINCIAL REFERENCES.

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Albion Hotel, Hastings
Albion Hotel, Manchester
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Bedford Hotel, Leamington
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Buck's Head Hotel, Glasgow
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Bell Hotel, Preston
Bush Hotel, Carlisle
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Café Royal, Edinburgh
Castle Hotel, Richmond
Castle Hotel, Windsor
Christ's Hospital, Hertford
Clarence Hotel, Brighton
Clarence Hotel, Manchester
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George Hotel, Cheltenham
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Guildhall Hotel, Bristol
Harrison's Hotel, Brighton
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Imperial Hotel, Cheltenham
Imperial Hotel, Dublin
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Jude's Hotel, Grafton-st., Dublin
Jury's Hotel, Dublin
King's Arms Tavern, Richmond
King's Head Hotel, Gloucester
King's Head Hotel, Horsham
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White Hart Hotel, [illegible]
White Hart Hotel, Salisbury
White Hart Hotel, Windsor
White Lion Hotel, Bath
White Lion Hotel, Brighton
White Lion Hotel, Bristol
Wolverton Station Refreshment-rooms
[illegible] rooms, Manchester
York House, Bath
York Station Refreshment-rooms, &c. &c.

(*For Sectional* [illegible] *Machine see Catalogue, Class 22.*)

DESCRIPTION OF THE SMALL CATALOGUE.

THE gathering of the materials of which the Catalogues of the Exhibition are composed, and their preparation for publication in a collected form, require a short notice. By a decision of the Executive Committee, each exhibitor was called upon to furnish a written account of the articles proposed to be exhibited, and to forward this description for the purpose of forming the Catalogue of the Exhibition. In order to facilitate this operation, certain general rules were printed, together with suggestions intended to furnish exhibitors with headings under which additional information might be given. In addition, four distinct kinds of printed forms were supplied to exhibitors, intended to serve for their manuscript descriptions in each of the four sections of the Exhibition—Raw Materials and Produce, Machinery, Manufactures, and Fine Arts. These forms were required to be sent in prior to the receipt of goods at the Building; and on their arrival, an acknowledgment forwarded served as a warrant for the admission of the articles described into the Exhibition.

The material of the Catalogues was thus obtained, but the form in which it appeared was such as to require very considerable modification before it could be issued from the press. The necessity for reducing the size of the Catalogues to one of convenience for use in the Building, demanded that the material of which they were to be composed should be considerably condensed. The danger of inaccuracy also in the scientific descriptions, and in their literary construction, required attention. A slight preliminary correction was applied to the forms, which were then set up in type.

The desirableness of obtaining a symmetry of proportion in the works, and as far as possible a harmony of style and consistency of expression, in addition to the great importance of attempting to communicate to them a character of scientific accuracy, demanded the adoption of general principles of correction and reconstruction. But the varied nature of the contents of the Exhibition, and of the descriptions supplied, rendered this a duty difficult to be undertaken by any single individual. A number of scientific gentlemen accordingly united to undertake the correction of proofs belonging to certain departments, principally in regard to the scientific inaccuracies they might contain, their labours being followed by a final, general, scientific and literary revision. The descriptions of exhibitors were therefore submitted to this process, and subsequently prepared for press after receiving the official sanction for their publication. In the Descriptive and Illustrated Catalogue, a number of elucidatory notes were supplied, which are intended to convey in a condensed form a variety of interesting and valuable information upon articles exhibited.

In this manner the large Catalogue was prepared. The present volume is a very condensed abstract of that work. It consists of essentially the same materials as the former Catalogue, having been prepared by Mr. G. W. Yapp from the corrected and annotated slips, and it has therefore the advantage of the care bestowed upon the former work. Three or four lines, on the average, being, for economy of space, the necessary limit of the descriptions in this Catalogue, its contents are confined, in the case of each exhibitor, merely to a brief indication of the name, residence, nature of the article, and position in the Building. The fuller details, accompanied with the illustrations, are to be found in the large Catalogue.

The extreme pressure of time under which the preparation of this Catalogue has proceeded, occasioned in a great measure by the delay of the return of forms, precludes the possibility of its complete accuracy. It is therefore requested that exhibitors will point out any errors presenting themselves, and without delay communicate the information, with the Class, Number, and the page in which they occur, to the Catalogue Office.

The mottos on the Title pages of the large Catalogue, and of the present volume, were selected by His Royal Highness Prince Albert.

ROBERT ELLIS.

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